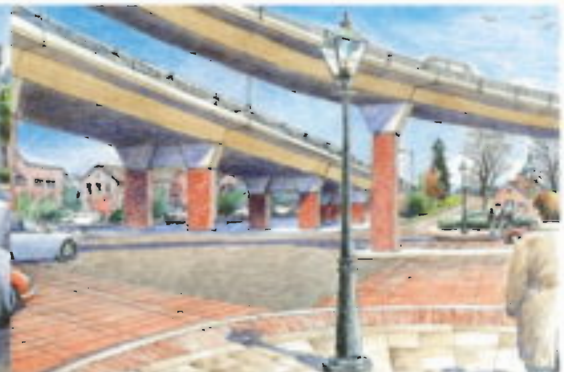
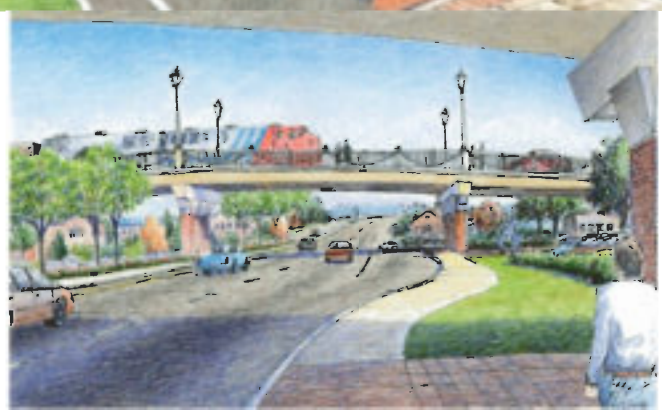
Bath Feasibility Study

PIN 10123.00, NH-10123(00)

Technical Memoranda





Prepared for:
Maine Department
of Transportation

Prepared by:
HNTB Corporation

HNTB

July, 2005

BATH

Bath Feasibility Study

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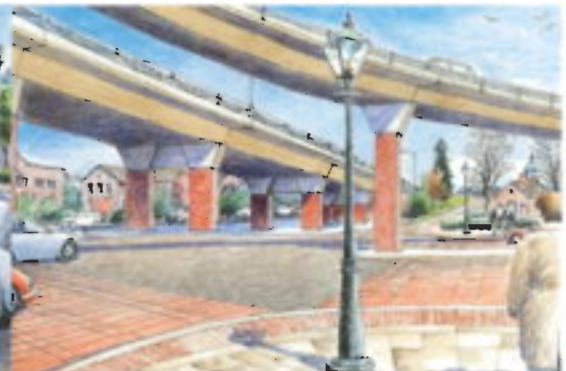

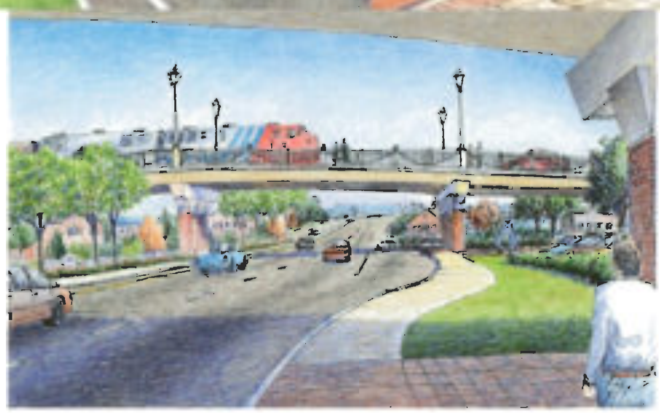

Prepared for:
Maine Department
of Transportation

DEPARTMENT OF TRANSPORTATION

Prepared by:
HNTB Corporation

HNTB

July, 2005

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Compendium of Natural Resources Technical Memoranda

The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005.512 **Date:** March 5, 2004

From: Irene Hauzar

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Floodplain Inventory

Methodology

Information on floodplain locations within the Study Area was obtained from Federal Emergency Management Agency (FEMA) mapping resources. Field reconnaissance was not conducted for this component of the study.

Information Sources

Existing information was obtained from the Flood Insurance Rate Map (FIRM)-City of Bath, Sagadahoc County, Maine, dated January 17, 1986. The FEMA floodplain Geographic Information Systems (GIS) datalayer was obtained from the Maine Office of Geographic Information Systems (OGIS). In addition, the 1997 City of Bath Comprehensive Plan section on floodplains was consulted.

Baseline Information

A floodplain is an area of land that is subject to a one percent or greater chance of flooding in any given year. Flood frequencies are measured as the chance of a particular area being flooded in any one year. It is the average time interval, in years, in which a given storm or amount of water in a stream will be exceeded.

The FEMA floodplain resource areas are classified as one of ten designations, from Zone A to Zone V. These designations outline whether the floodplain has been determined by approximate methods or through a detailed study. The floodplains in the Study Area are classified by the FEMA system as Zone A—Special Flood Hazard Areas inundated by the 100-year flood; determined by approximate methods; no base flood elevations shown and no Flood Hazard Factors determined. The base flood elevation for the 100-year floodplain within the Study Area is 9 feet.

Results of Inventory

On page 3 of 3 the Floodplain figure depicts the locations of 100-year floodplains. There are two areas of floodplain within the Study Area, namely those associated with the Kennebec River and those associated with the Whiskeag Creek.

Study Corridors 500 feet wide were delineated within the immediate area of Route 1 and along one potential alignment of a new Route 209 Spur, as shown in the attached figure. Portions of the Route 1 Study Corridor are located within the 100-year floodplain of the Kennebec River generally from approximately Washington Street to the river. In this area, a portion of the existing rail corridor also is located within the 100-year floodplain. At the westerly edge of the Study Area, a small portion of the Route 1 Study Corridor is located within the 100-year floodplain of the Whiskeag Creek. The westerly and easterly ends of the Route 209 Spur Study Corridor are located within the 100-year floodplains of the Whiskeag Creek and Kennebec River, respectively.

Bath Feasibility Study Floodplains

Maine DOT PIN 10123.00

Study Area
Roadways
Property Lines
Waterbodies
100 Year Floodplain (Zone A)
Study Corridor

Feet
0 250 500 1,000 1,500 2,000

The Smart Associates
Environmental Consultants, Inc.

To: Irene Hauzar, HNTB **Date:** March 18, 2004

From: Jim Fougere, The Smart Associates

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Natural Resources Technical Memorandum

This technical memorandum documents the existing natural resources found within the Study Area for the Bath Feasibility Study. The resource categories reviewed include: wetlands; groundwater and surfaces resources; wellhead protection districts; threatened and endangered species; wildlife habitat; and soils and geology.

Wetlands

Methodology

Federal and state jurisdictional wetlands within the Study Area were identified through the use existing data. Information on the Study Area's wetlands were obtained from the Bath National Wetland Inventory map (USFWS, 1992), and from the Maine Office of Geographic Information Systems (OGIS) electronic mapping information. Federal wetland classifications described below were assigned according to the criteria published by the USFWS in Cowardin et al (1979). Hydric soils data for Sagadahoc County are not available in digital format at this time. No field reconnaissance was conducted for this component of the study.

Information Sources

Existing information was obtained from the Maine Office of Geographic Information Systems (OGIS), and the National Wetlands Inventory mapping. In addition, the Route 209 Bypass Feasibility Study (VHB, 1995) section on wetlands was consulted.

Regulatory Context

Federal jurisdiction of wetlands is regulated by the U.S. Army Corps of Engineers (ACOE) and Environmental Protection Agency (EPA), in accordance with Section 404 of the Clean Water Act. Under Section 404, the ACOE can authorize the issuance of dredge and fill permits within waters of the United States, which include wetlands. The EPA has a program oversight role and has the authority to make final determinations of the applicability of Section 404 to specific projects. Input is solicited from the United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS).

Under Section 404, before a project may proceed with either dredging or filling of a wetland, it must be shown that efforts have been made to avoid impacts, minimize unavoidable impacts, and compensate for any remaining impacts.

Executive Order 11990, Protection of Wetlands also addresses wetland impacts, requiring all federal agencies to minimize the destruction, degradation, or loss of wetlands. The lead federal agency for a project must make appropriate findings documenting compliance with this Executive Order.

Freshwater wetlands are regulated by the State of Maine under the Natural Resources Protection Act (NRPA) (38 MRSA § 480-A through § 480-Z) and the Maine Department of Environmental Protection (MDEP) Wetland Protection Rules (Chapter 310). The Act regulates dredging, draining, filling, and other alterations. The NRPA program is administered by the Maine Department of Environmental Protection (Maine DEP).

Results of Inventory

Due to the urban and built-up nature of the Study Area, the number of wetlands in the Study Area is limited. Wetland systems (Cowardin et al., 1979) identified in the Study Area include Estuarine and Palustrine systems. A total of five wetland classes were noted in the Study Area based on Cowardin et al (1979) as noted on the National Wetlands Inventory (NWI) maps and OGIS wetland data. The wetland classes found in the Study Area include Estuarine Intertidal Emergent (E2EM), Palustrine Emergent (PEM), Palustrine Forested (PFO), Palustrine Scrub Shrub (PSS) and Palustrine Unconsolidated Bottom (PUB).

The Kennebec River and its contiguous wetlands are considered to be an Estuarine system with an area just east of Pine Street classified as Estuarine, Intertidal, Emergent (E2EM1), while the river itself is considered to be Estuarine, Subtidal,Unconsolidated Bottom (E1UBL). Palustrine wetlands are described in Cowardin (1979) as including all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas with salinities less than 0.5%. Non-vegetated Palustrine wetlands are described and included in the Palustrine Unconsolidated Bottom class. The Palustrine system classes can be described as including:

> Palustrine Emergent (PEM) – characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. Subclasses include persistent emergent, and non-persistent emergents.
>
> Palustrine Forested (PFO) -- the forested class is characteristic by woody vegetation that is 20 feet or taller. Subclasses include broad-leaved deciduous, needle-leave deciduous, broad-leaved evergreen, needle-leaved evergreen, and dead.
>
> Palustrine Scrub/Shrub (PSS) -- includes areas dominated by woody vegetation less than 20 feet tall. Subclasses include broad-leaved deciduous, needle-leaved deciduous, broad-leaved evergreen, needle-leaved evergreen and dead.
>
> Palustrine Unconsolidated Bottom (PUB) -- this class includes all wetland and deepwater habitats with at least 25% cover of particles smaller than stones and a vegetative cover less than 30%.

The number of wetlands identified in the Study Area is 11 (see page 9 of 9). Wetland acreage by type is summarized in the following table.

Wetland Type	Acres
Estuarine Intertidal Emergent	0.7
Palustrine Emergent	5.3
Palustrine Forested	2.7
Palustrine Scrub Shrub	5.3
Palustrine Unconsolidated Bottom	1.1

Source: Based on NWI maps

The majority of the wetlands are located along Whiskeag Creek, in the southwestern section of the Study Area.

Groundwater, Surface Water, and Wellhead Protection Districts

Methodology

Baseline information describing groundwater, surface water, and wellhead protection districts was obtained through the Maine Office of Geographic Information Systems and through the Maine Geological Survey (MGS). No field reconnaissance was conducted for this component of the study.

Information Sources

Hard copies of maps such as the Significant Aquifer Map for the Bath Quadrangle, was obtained from MGS, Open File No. 99-19 (1999). Additional mapping available from other sources included Bedrock Well Depths in the Bath 30 x 60 minute quadrangle (Open File 02-8; Maine Geological Survey, 2002), and Bedrock Well Yields in the Bath 30 x 60 minute quadrangle (Open file 02-7; Maine Geological Survey, 2002). The location of public wells was obtained through the Maine Department of Human Services, Division of Health Engineering, Drinking Water Program.

Surface water resources within the Study Area were mapped based primarily on the existing information contained on the U.S. Fish and Wildlife Services National Wetland Inventory mapping contained on the Maine Office of Geographic Information Systems website (OGIS) and the United States Geological Survey topographic quadrangle mapping Bath, Maine (U.S.G.S., 1985).

Regulatory Context

Groundwater
Groundwater resources are overseen at the federal level by the EPA through the administration of the Safe Drinking Water Act of 1974 (SDWA), as amended, and to a lesser extent the Clean Water Act Section 404 (CWA). At the state level, the Maine Department of Environmental Protection (DEP) is responsible for groundwater protection, while drinking water is administered through the Department of Human Service, Division of Health Engineering, Drinking Water Program which is responsible for enforcing the federal SDWA in terms of water quality at the point of use.

Surface Waters
Surface water resources are regulated under federal legislation enacted to protect the quality of the nation's surface water. The primary federal legislation pertaining to this study is the CWA, which establishes a federal policy to regulate the discharge of pollutants into the nations surface

waters. Any work within the "waters of the U.S." requires a permit under Section 404 of the CWA (33 U.S.C. s/s 121 et seq,1977). Other federal requirements include Section 401 (CWA) Water Quality Certification which is administered through the State of Maine. Section 303(d) of the CWA requires states to identify water body segments that do not attain water quality standards or are imminently threatened and are not expected to meet state water quality standards.

At the state level, the Maine DEP oversees surface water issues through a number of policies and regulations including the Maine Natural Resources Protection Act (38 MRSA § 480-A et seq.) Maine DOT projects are also reviewed for compliance with the 1998 Stormwater Management MOA.

Shoreland Zoning
The State of Maine Mandatory Shoreland Zoning Act (38 MRSA § 435 et seq.) requires municipalities to establish land use controls for all areas within 250 feet of ponds and non-forested freshwater wetlands that are 10 acres or larger; rivers with watersheds of at least 25 square miles in area; coastal wetlands and tidal wetlands; and all lands within 75 feet of certain streams.

Drinking Water
Wellhead Protection Areas are designated to protect public water supplies from sources of contamination. The SDWA is the federal act established to protect the quality of drinking water in the U.S. This law focuses on all waters actually or potentially designated for drinking use, whether from aboveground or underground sources.

The State of Maine implements a Wellhead Protection Program, under the Maine Drinking Water Program (DWP). The DWP is responsible for enforcing the SDWA and has primary responsibility for administering the state's rules related to drinking water.

<u>Results of Inventory</u>

Drinking water wells noted in the Study Area by the DWP program include one public water supply well at the Hyde School on High Street, south of Route 1, as depicted on page 9 of 9. This well has a 300-foot wellhead protection zone surrounding it. These well head protection zones are established around small public water supply wells and are intended to be used as a planning tool to evaluate potential land uses and their impacts on the local water quality.

The Significant Aquifer Map for the Bath Quadrangle does not identify any Significant Sand and Gravel Aquifers in the Study Area. The Maine State Geologist, Department of Conservation (2003) also noted no aquifers exist in the Study Area.

Surface waters noted in the Study Area include an unnamed stream system which occurs south of Route 1, in the southwest corner of the Study Area. This stream flows to the north, eventually entering the Whiskeag Creek. A separate branch of this stream occurs to the north of Route 1, just south of Centre Street. This stream flows south to connect the previously noted stream just to the south of Route 1. The largest water body in or adjacent to the Study Area is the Kennebec River, which is noted as the eastern boundary of the Study Area.

There are no rivers within the Study Area that are currently part of the federal Wild and Scenic Rivers Program.

Threatened and Endangered Species

Methodology

Information on the presence of threatened and endangered species within the Study Area was obtained by requesting file searches by resource agencies, including the U. S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NWFS), the Maine Department of Inland Fisheries and Wildlife (MDIF&W), and the Maine Natural Areas Program (MNAP). No field reconnaissance was conducted for this component of the study.

Information Sources

Existing information was obtained from the database files at the USFWS, NWFS, MDIF&W, and MNAP. In addition, data from the Maine Office of Geographic Information Systems (OGIS) was obtained.

Regulatory Context

The Endangered Species Act of 1973 (16 U.S.C. 1531 et seq., as amended) requires that federal agency action, or actions which require a federal permit, do not jeopardize the continued existence of a threatened or endangered species (specified in 50 CFR 17.11 and 17.12), or result in the destruction of any designated critical habitat (specified in 50 CFR 17.94 and 17.96). Under Section 7 of the Act, consultation with the Secretary of the Interior (delegated to the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS) is required if a proposed federal action may affect the continued existence of a listed species. This consultation requires the production of a Biological Assessment, which assesses the potential impacts of the project on the listed species using the best available information. If the existing information is inadequate, the proponent may be required to conduct original studies to support the Biological Assessment. Based upon the Biological Assessment, the USFWS (or the NMFS) issues a Biological Opinion. This opinion, which is binding on the proponent, may either allow the project to proceed unaltered; allow it to proceed, providing certain mitigating measures are implemented; or disallow the project ("jeopardy opinion").

Maine's Endangered Species Act protects the "essential habitat" of the state's rare species (12 MRS § 7754 (2,3) and § 7755-A (1,2,3). Records for rare plants or botanical features are maintained through the State of Maine, Department of Conservation, Natural Areas Program. Records of threatened, endangered, and special concern species of wildlife are maintained by the Maine Department of Inland Fisheries and Wildlife (MDIF&W).

Results of Inventory

No federally-listed wildlife species are known to occur in the Study Area, with the exception of occasional, transient bald eagles (*Haliaeetus leucephalus*) (McCollough, 2003). "Occasional, transient" refers to birds which are only known to pass through a location rather than a nesting species. The National Marine Fisheries Service (NMFS) did identify the federally endangered shortnose sturgeon (*Acipenser brevirostrum*) as occurring in the estuarine complex of the Kennebec, Sheepscot and Androscoggin Rivers. As a result any federal action that may affect these species must undergo Section 7 consultation.

According to the Maine Natural Areas Program's Biological and Conservation Data System files, there are no records of state-listed botanical features in the Study Area (Bingel, 2003).

Wildlife Habitat

Methodology

Vegetative communities in the Study Area combine with land use patterns and the availability of cover types to provide the various wildlife habitats within the Study Area. Based on the urban and developed character of the Study Area, the overall availability of wildlife habitat is limited. Specific habitat information and characteristics, such as Significant Wildlife Habitat (e.g., deer wintering areas), identified by MDIF&W have been utilized to help define the available habitat in the Study Area.

Unfragmented habitat blocks represent contiguous areas of forest and other vegetative communities with limited disturbance. The availability of unfragmented blocks of habitat within the Study Area is limited, however available information, including U.S.G.S. topographic maps, and aerial photography where utilized to examine this resource community.

Information Sources

Existing wildlife habitat information including Significant Wildlife Habitat in the Study Area was obtained through contacting MDIF&W Region A in Gray, Maine. Significant wildlife habitats include critical or important wildlife habitats, Essential Wildlife Habitats, deer wintering areas, and Waterfowl and Wading Bird habitat.

Regulatory Context

The Fish and Wildlife Coordination Act (16 U.S.C. 662(a)), requires consultation with the USFWS and for this study regarding any significant impact to fish and wildlife resources, including direct impact to fish and wildlife, loss or modification of habitat, and degradation of water quality.

Significant wildlife habitat is also protected by the State of Maine under NRPA (38 MRSA § 480-A through 480-Z). Activities may not "unreasonably harm any significant wildlife habitats, freshwater wetland plant habitat, aquatic habitat, travel corridor, freshwater, estuarine, or marine fisheries or other aquatic life." However, only significant habitats that are mapped by MDIF&W are protected. MDIF&W also is consulted under the Fish and Wildlife Coordination Act regarding fish and wildlife resources in the Study Area.

Results of Inventory

The Study Area includes a limited range of potential wildlife habitats, due to the mostly urban and built up environment.

Significant habitat resources noted on the MDIF&W map of the Study Area indicated an emergent wetland community just east of Pine Street, adjacent to the Kennebec River. Inland Waterfowl and Wading Bird Areas are noted just north of North Street, beyond the limits of the Study Area.

Unfragmented Habitats
The availability of unfragmented habitats in the Study Area is limited by the existing development within the Study Area. No large blocks of forestland and other cover types are located in the Study Area. The largest community of relatively undeveloped land occurs in the

southernmost portions of the Study Area, west of High Street and southwest of Hyde School. This area continues outside the Study Area to the south.

Soils and Geology

Methodology

Soils and surficial geology data were reviewed in order to preliminarily determine the location of soils that may be a constraint to the study, such as wetlands. Similarly, soils such as clays or till could be a consideration from an engineering perspective.

Information Sources

Maine OGIS soil survey information identifies soil groupings for the entire State of Maine. Additional soil information for the Study Area was found on paper maps for the Androscoggin and Sagadahoc Counties Soil Survey (McEwen, 1970) and the 2002 Surficial Geology map Open-File No. 02-145.

Regulatory Context

No regulations on the federal and state level specifically address soils and surficial geology.

Results of Inventory

Soils
According to the soils groupings obtained through the Maine OGIS, there are two soils groups in the Study Area comprised of four soil series. These soils range from the excessively drained Abrams series to the moderately well drained Buxton series. Similarly, the Natural Resources and Conservation Service (NRCS) Soil Survey (McEwen, 1970), identifies four main soils series found within the Study Area which include the Hollis, Scantic, Buxton and Made land soil series. The Hollis Series is classified as a well-drained sandy loam with numerous rock outcrops. The Scantic and Buxton Series are typical of coastal lowlands and river valleys and have characteristics of silt loam and silty clay soils. Scantic is classified as a hydric soil in Maine. Made land refers to historically filled areas.

These soil series are scattered throughout the Study Area, however typical occurrences are noted. In general, Made land is located along the west bank of the Sagadahoc River in the developed areas. The Hollis series includes much of the residential development in the City of Bath, as well as a large portion of the land south of Route 1 continuing beyond the Study Area. Scantic soils are generally associated with low areas and drainageways such as along the Whiskeag Creek and drainageways north and south of Centre Street. The Buxton series are interspersed across the Study Area but typically are located in low regions.

Surficial Geology
The surficial geology of the Study Area, as depicted and described in the 2002 Surficial Geology map, Open-File No. 02-145 indicates mostly thin-drift areas across the Study Area with pockets of Presumpscot Formation in lower areas. Areas along the Kennebec River western shore, north and south of Route 1 are identified as Artificial fill areas. The following are characteristics present in the Study Area as described by the Maine Geological Survey (2002):

- Freshwater wetlands – Muck, peat, silt, and sand. Poorly drained areas, often with standing water. These wetland communities are generally associated with the Whiskeag Creek in the southwest corner of the Study Area.

- Saltmarsh wetland – Coastal marsh areas, subject to tidal flooding. A small area of salt marsh is identified east of Pine Street, in the southeastern portions of the Study Area.
- Presumpscot Formation – Massive to laminated silty clays which overlie rock and till, and are interbedded with and overlie end moraines and marine fan deposits. This geologic feature is generally associated with low spots including Whiskeag Creek, as well as a series of narrow unnamed streams north and south of Centre Street.
- Thin drift areas – Areas with generally less than ten feet of drift covering bedrock. Thin drift areas cover the majority of the Study Area surface with other communities described above occurring as narrow features or inclusions.

Wetlands

- Estuarine Emergent Vegetation
- Palustrine Emergent Vegetation
- Palustrine Forested
- Palustrine Scrub Shrub
- Palustrine Unconsolidated Bottom
- Study Area
- Roadways
- Property Lines
- Waterbodies
- Public Wells
- Wellhead Protection Area
- 100 Year Floodplain

Bath Feasibility Study
Natural Resources

Maine DOT PIN 10123.00

Feet
0 250 500 1,000 1,500 2,000

Compendium of Social and Economic Technical Memoranda

The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005.513 **Date:** March 4, 2004

From: Irene Hauzar

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Community Facilities Inventory

Methodology

Information on existing community facilities in the Study Area was obtained by requesting file searches by state agencies, researching GIS data from the Maine Office of GIS, and through personal communications with City of Bath officials. In addition, secondary data sources were consulted, including previous reports and studies. Limited field reconnaissance was conducted for this component of the study.

Information Sources

The following studies were reviewed:

- Route 209 Bypass Study, April 1995
- Explore Maine, January 2002
- The Action Plan for Bath's Waterfront and Downtown, February 1999
- City of Bath Comprehensive Plan, 1997
- City of Bath Zoning Ordinances, 2003

Other sources of data included the Maine Office of GIS, the Mid-Coast Maine Chamber of Commerce map of the City of Bath and the City of Bath website www.cityofbath.com. In addition, interviews with the City of Bath Planning Director, Jim Upham, were conducted.

Baseline Information

There is one elementary school, one public high school, and one private high school within the Study Area. The Fisher Mitchell Elementary School is located at 597 High Street, near the intersection of High Street and Russell Street. The 2003 enrollment was 185 students in grades one through five. A public high school, the Morse High School, located at 826 High Street, near the intersection of High Street and Winter Street, enrolls students from ninth grade through twelfth grade. The 2003 enrollment was approximately 775 students. The Hyde School campus, encompassing 126 acres, is located at 616 High Street. It is accessed off Russell Street, at the intersection of High Street and Russell Street. The Hyde School is a private boarding school that enrolls students in grade nine through twelve. The 2003 enrollment was 210 students.

The Bath Police Department is centrally located on Water Street, in Downtown Bath. The Bath Police Department consists of 32 employees, including 20 sworn officers. The Bath Fire Department is located at the intersection of High Street and Winter Street. The Bath Fire Department consists of 21 paid employees, and 36 on-call volunteer firefighters.

There is one library in the City of Bath, the Patten Free Library. It is located at the intersection of Front Street and Summer Street. It contains over 143,000 library items, including books, audio and videocassettes. There are no cemeteries within the Study Area.

There are several churches within the Study Area, including: the Elim Community Church, located at the intersection of Middle and Walker Streets; St. Mary's Church, located at the intersection of Lincoln Street and Green Street; First Parish New Jerusalem Church, located at the intersection of Middle and Winter Streets; and the United Church of Christ, located on Congress Avenue north of Centre Street.

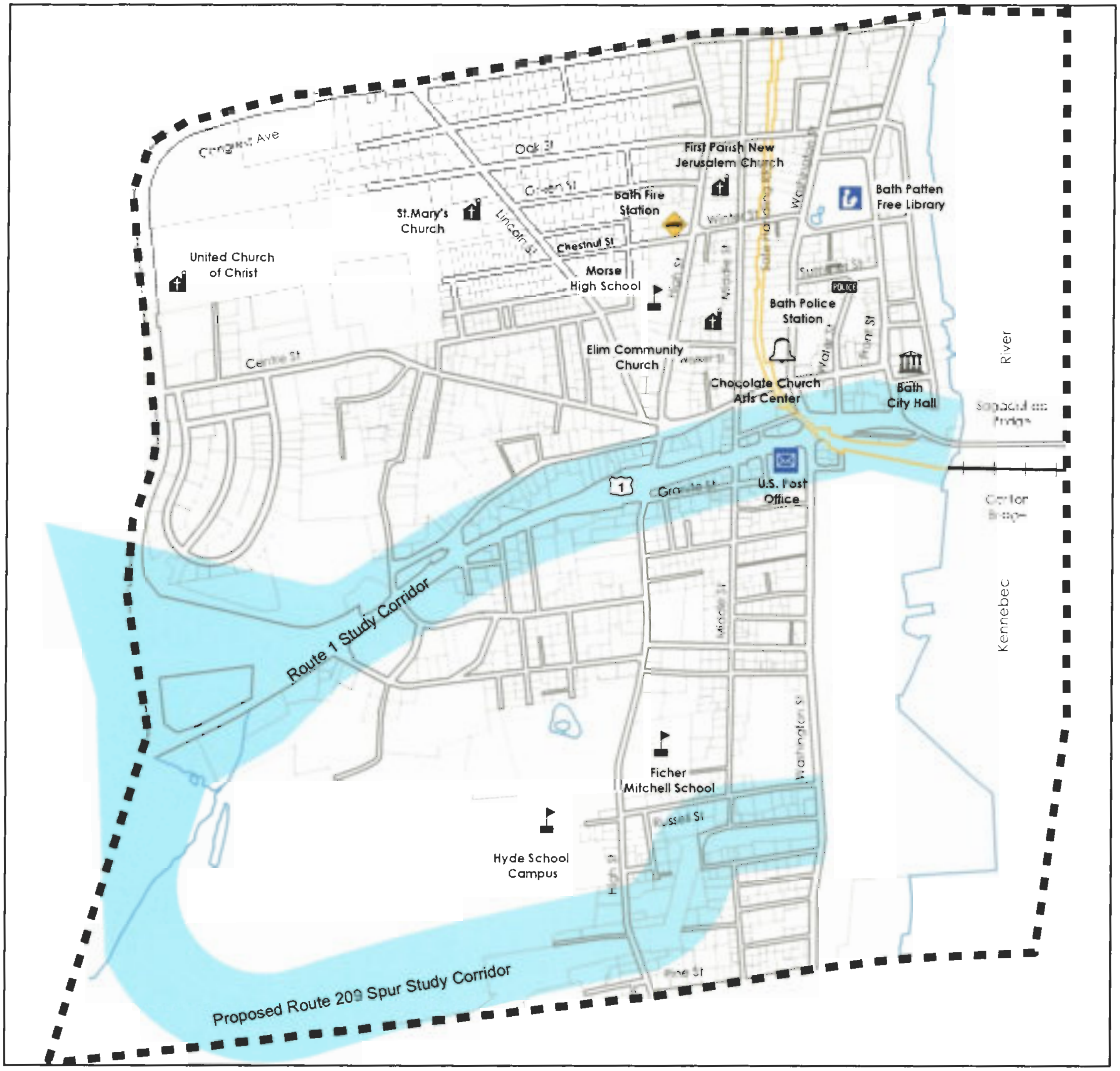
Bath City Hall is located on Front Street and contains municipal services for the residents of the City of Bath. The United States Post Office is located on Washington Street.

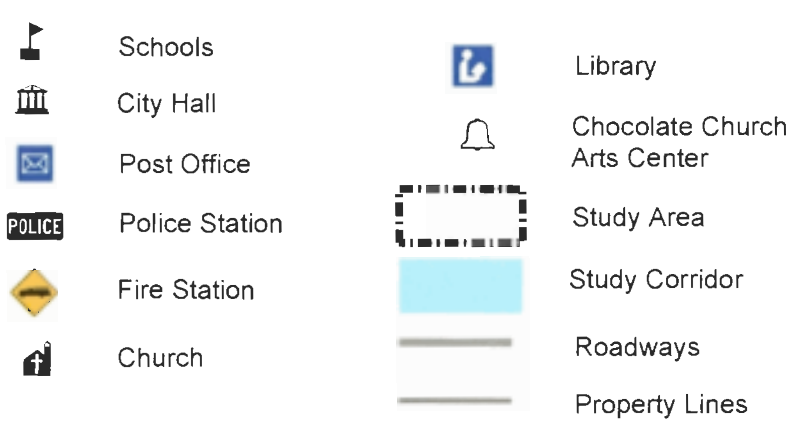
The Chocolate Church Arts Center is a Gothic Revival church built in 1847 and is an excellent example of a Gothic Revival architecturally styled church in Maine. It is located near the intersection of Water and Court Streets. In 1976 the church was converted to a performing arts center and is no longer used for religious purposes. Activities at the Chocolate Church Arts Center include music, theatre, and an art gallery.

<u>Results of Inventory</u>

Attached is a figure depicting the locations of the community facilities in the Study Area.

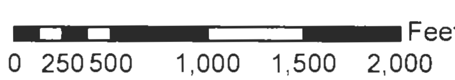
Study Corridors 500 feet wide were delineated within the immediate area of Route 1 and along one potential alignment of a new Route 209 Spur. The United States Post Office facility on Washington Street is within the Route 1 Study Corridor. An undeveloped portion of the Hyde School Campus is located within the Route 209 Spur Study Corridor. All other community facilities are outside of the study corridors.





Bath Feasibility Study Community Facilities

Maine DOT PIN 10123.00



HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-003.311 **Date:** May 20, 2004

From: Doug Mann, Tricia Amador Woliver

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Context Sensitive Design Solutions

Context Sensitive Design Solutions -- What is it?

Accessibility is vital to establishing community connections, henceforth, so are bridges and structures. Context Sensitive Design Solutions combines planning, engineering, architecture, urban design, technology and public involvement to aesthetically integrate transportation facilities into the communities they serve. The facilities will meet the community's needs, while preserving the natural and man-made environment and providing safe access to modes of transportation.

Through this context sensitive design solution approach, the improvements will enhance the community's character to create a more livable environment. Creating a balance of safety, mobility, aesthetics, economics and community values will create memorable transportation facilities.

Background

The feasibility of the options will be examined based upon the costs, transportation benefits, engineering issues, community issues, and environmental issues. Based on the preliminary review and analysis of the information gathered, the project team reviewed both the current and future issues that affect the corridor study (Refer to the Physical, Visual & Character Analysis Technical Memorandum). Issues were identified to determine the urban design goals and objectives for the Route 1 corridor. Steering Committee meetings and a Public Workshop were held to identify the social, economic and environmental issues that most concern the citizens of Bath and to define the community's aspirations for the corridor (Refer to Exhibit 1).

In addition, secondary data sources were consulted, including previous reports and studies. For analysis purposes, the Commercial Zone is the area from the City of Bath city limits at Congress Avenue to High Street on Route 1. The Downtown Zone is the area from High Street to the Sagadahoc Bridge on Route 1.

Current Issues

Through the meetings and discussion mentioned above, the project team produced a raw list of what people liked and disliked about the existing Route 1 corridor and identified what they would like the corridor to become (Please refer also to the Transportation Technical Memorandum for the transportation issues).

Those community issues are as follows:

- Limited access points along Route 1 for pedestrians and vehicles
- Limited visual connections between the eastern and western portions of Route 1
- Lack of community identity
- Lack of gateway feature
- Lack of sense of arrival & place
- Lack of aesthetics along Route 1
- Minimal use of historical, natural and cultural resources and amenities
- Need for a more visible downtown to promote tourism
- Need for wayfinding programs
- Need for traffic calming measures
- Need to maintain and promote neighborhood connections
- Need to maintain neighborhood scale
- Limit community impacts
- Promote development at the Commercial Zone

Goals and Opportunities

A key goal of the Study is to re-connect downtown Bath with the rest of the city and to knit back together areas and neighborhoods that have been divided by Route 1. This can be done not only by improving roadways, but also by considering overall mobility including pedestrian-bicycle access. Improvements should preserve and enhance historic, aesthetic, environmental, and other community assets, and improvement designs should reflect community values.

A number of unique opportunities have been identified for the Bath Feasibility Study:

- **Provide a safe and efficient traffic system** (Please refer also to the Transportation Technical Memorandum for engineering and alignment aspects). Traffic calming measures need to be in place to slow traffic along the Route 1 Corridor. The intent is not to stop traffic but to reduce traffic speeds whereby pedestrian and vehicular movements are safe and efficient. Wider medians and landscaped edges provide a safety barrier to pedestrians and oncoming traffic while also providing aesthetics and traffic calming. Other traffic calming techniques can be applied. For example, the pavement can be treated with texture and other materials such as bricks. It is important to note that the businesses along the Route 1 Commercial Zone will be impacted, regardless of the median width because these businesses have currently been using the highway right of way. Refer to Exhibits 3, 4, 5 & 6 -- These sections show the existing and proposed right of ways and how the median and the edges are treated with landscape and sidewalks.

- **Provide a safe integration of vehicular traffic with pedestrians and bicycles**. Both vehicular and pedestrian access improvements need to be made across Route 1. Options presented to the Steering Committee included pedestrian sidewalks incorporated in all bridge overpasses and also running along the Route 1 Corridor wherever feasible (Refer to Exhibits 7 – 9). For some options, a pedestrian tunnel is proposed underneath Route 1 near the approach to the Sagadahoc Bridge. The minimum design width of 20'-

0" is advisable for safety and visibility. Pedestrian linkages need to be made to existing and proposed parks, development, historical and natural amenities.

- **Create visual "gateways" at both ends of the Route 1 Corridor that announce entry into the City of Bath and the Historic Downtown Bath and reflect local heritage.** Refer to Exhibit 2 – Historical and site photography are exhibited to showcase the architectural heritage of the City of Bath that could be used as precedence for the future design of the structures of the Route 1 Corridor.

- **Create a corridor with effectively managed access** (Please refer also to the Transportation Technical Memorandum for access management). It is preferable to minimize curb cuts on Route 1 and concentrate them on bigger development parcels rather than small individual parcels. Future access points should not be on Route 1.

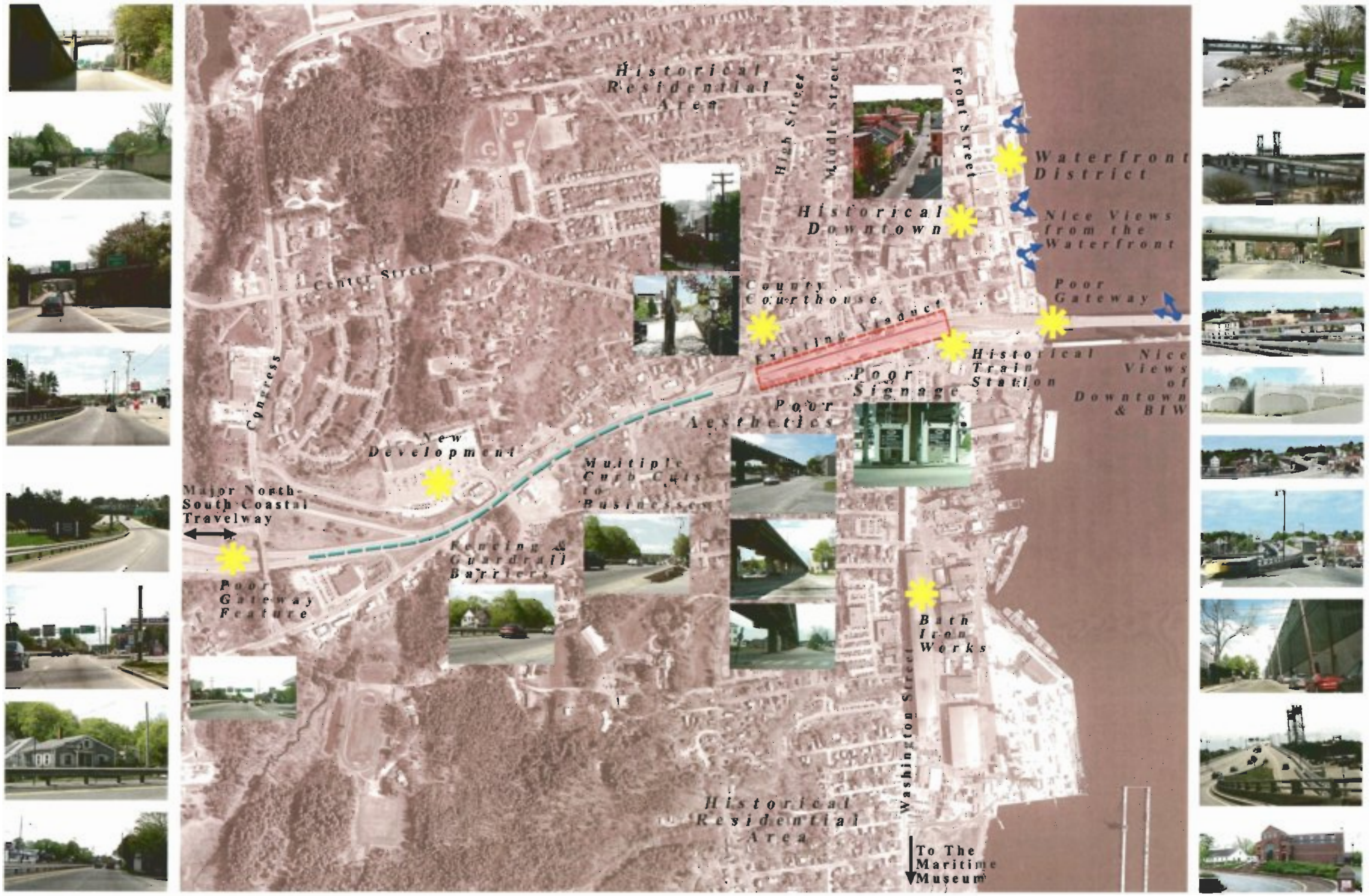
- **Create a corridor-wide physical and intuitive wayfinding program by using transportation enhancements**. A unified landscape, site furniture, aesthetics, architecture, and signage & wayfinding treatments will create a sense of arrival and sense of place for the City of Bath.

Framework for Developing and Evaluating Improvement Options

The unique issues and opportunities mentioned above provide a framework for developing and evaluating the improvement options. It is important to recognize that this framework needs to be evaluated along with other factors such as governing regulatory requirements, property impacts and costs. (Please refer also to the Transportation Technical Memorandums for these other factors).

Supporting Exhibits

Attached are cross sections, perspective renderings and plan map drawn conceptually to support and articulate the context sensitive solutions for the proposed design options.



BATH City of Ships

DEPARTMENT OF TRANSPORTATION

BATH FEASIBILITY STUDY
Maine DOT # 10123.00

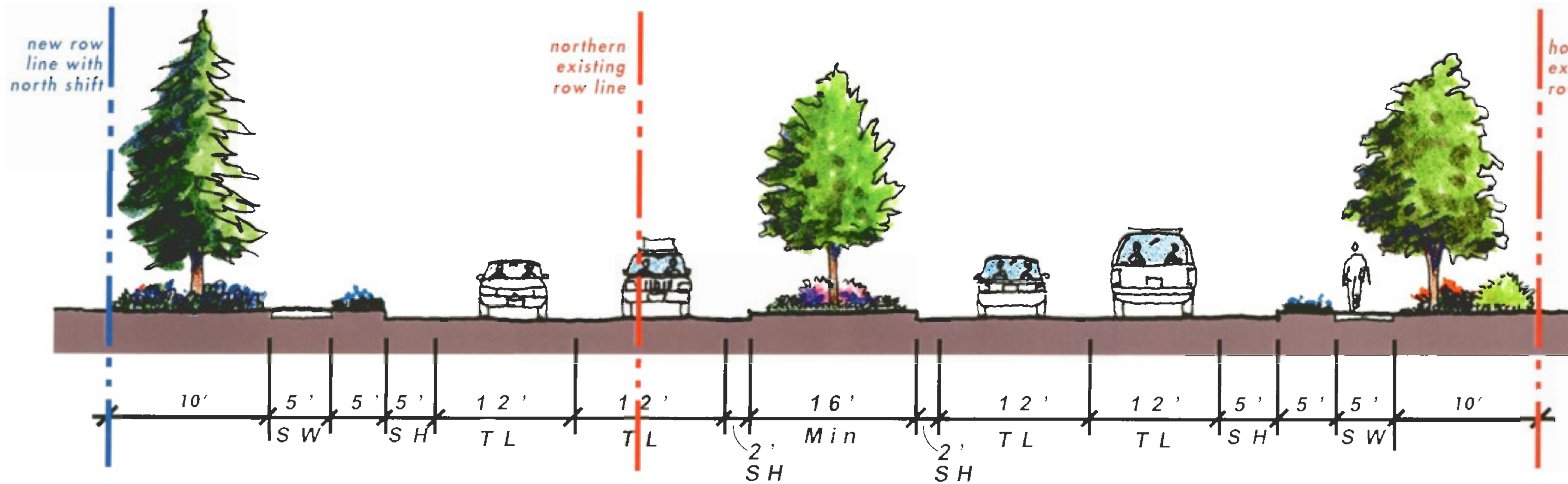
EXHIBIT 1:
PHYSICAL & VISUAL CHARACTER ANALYSIS

BATH
City of Ships

DEPARTMENT OF TRANSPORTATION

BATH FEASIBILITY STUDY
Maine DOT # 10123.00

<u>EXHIBIT 2:</u>
ARCHITECTURAL CHARACTER STUDY



LEGEND

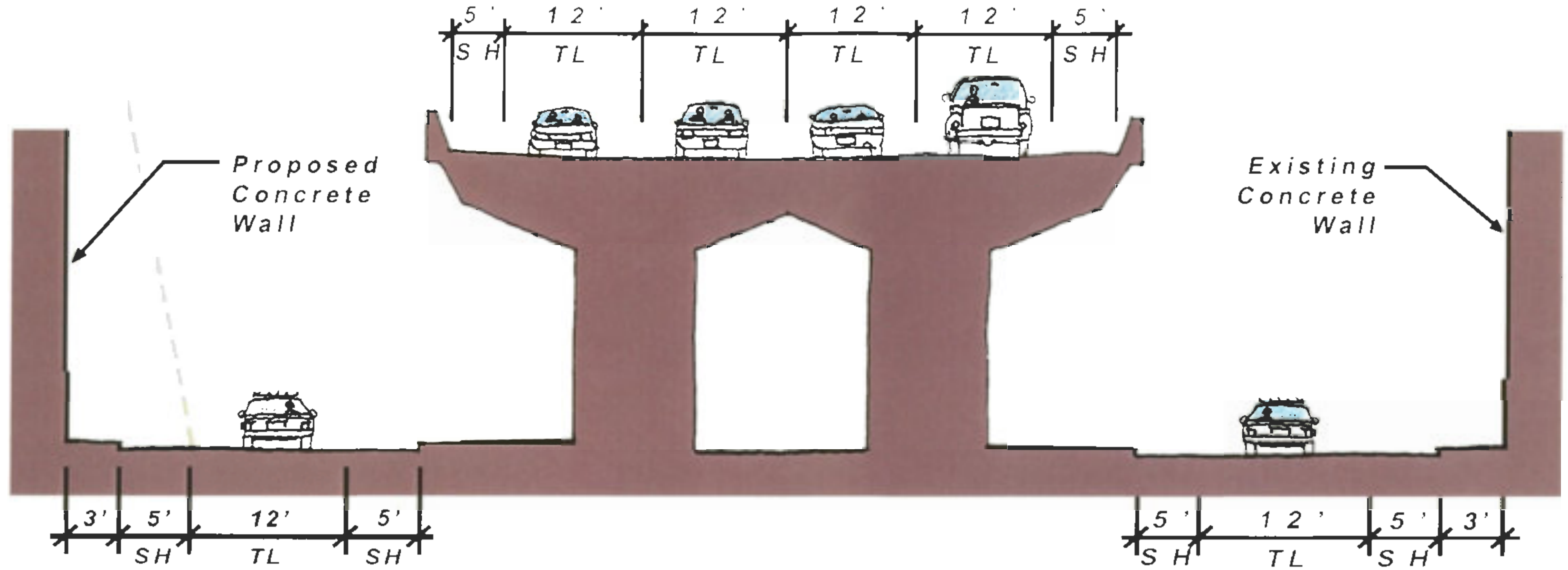
SW	Sidewalk	ROW	Right of Way
SH	Shoulder		Existing ROW
TL	Travel Lanes		Proposed ROW

BATH City of Ships

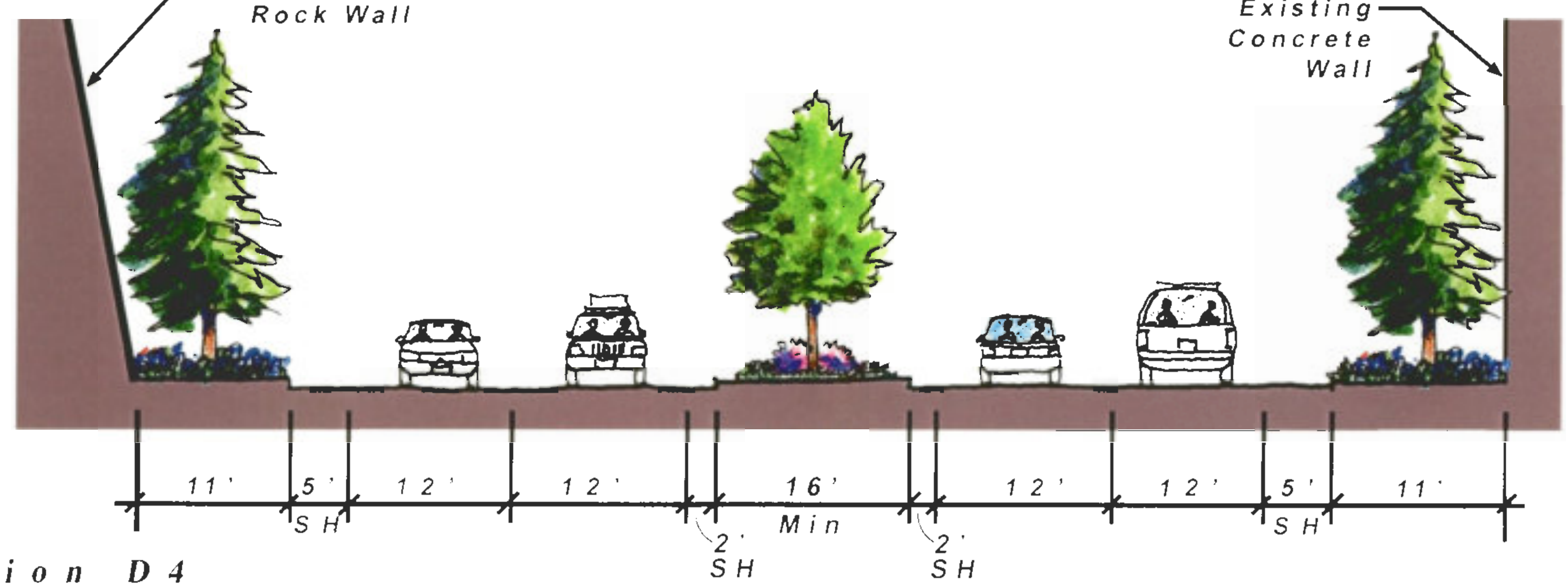
DEPARTMENT OF TRANSPORTATION

BATH FEASIBILITY STUDY
Maine DOT # 10123.00

EXHIBIT 3:
COMMERCIAL ZONE
Option CI & C2 Section



Option D1



Option D4

LEGEND

SW	Sidewalk	ROW	Right of Way
SH	Shoulder	– –	Existing Rock Retaining Wall
TL	Travel Lanes		

BATH
City of Ships

DEPARTMENT OF TRANSPORTATION

BATH FEASIBILITY STUDY
Maine DOT # 10123.00

EXHIBIT 4:
TRANSITION AREA
Option DI & D4 Sections

Before

After

BATH FEASIBILITY STUDY
Maine DOT # 10123.00

EXHIBIT 5:
COMMERCIAL ZONE
Option C1:Before & After Sketch

Before

After

BATH City of Ships

DEPARTMENT OF TRANSPORTATION

BATH FEASIBILITY STUDY
Maine DOT # 10123.00

EXHIBIT 6:
COMMERCIAL ZONE
Option C2: Before & After Sketch

Before

After

BATH City of Ships

DEPARTMENT OF TRANSPORTATION

BATH FEASIBILITY STUDY
Maine DOT # 10123.00

EXHIBIT 7:
DOWNTOWN DISTRICT
Option D1: Before & After Sketch

Before


After

BATH FEASIBILITY STUDY
Maine DOT # 10123.00
EXHIBIT 9:
DOWNTOWN DISTRICT
Option D4 - Rail On Viaduct
Before & After Sketch

HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-002.224 **Date:** May 20, 2004

From: Doug Mann, Tricia Amador Woliver

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Corridor Context: Physical and Visual Character Analysis

Purpose

It is the intent of the Maine Department of Transportation to integrate community values into the design of the Route 1 Corridor. To accomplish this important goal, principles of Context Sensitive Design (CSD) will be employed. The initial part of the CSD process is the 'Physical and Visual Character Analysis. The Project Team has reviewed the physical context of the corridor with a particular emphasis on physical elements, both natural and man-made. The following memo and supporting graphics will summarize the character analysis.

For purposes of this analysis, the corridor elements are categorized by "The View From the Road" and "The View To the Road". The 'View From the Road" are the views and elements seen and experienced from the vantage point of the Route 1 user. The 'View To the Road' are the views and elements seen and experienced from the neighboring adjacency toward Route 1. The Commercial Zone is the area from the City of Bath city limits at Congress Avenue to High Street on Route 1. The Downtown Zone is the area from High Street to the Sagadahoc Bridge on Route 1.

Sources of Data & Analysis

The following documents were reviewed:

- The Action Plan for Bath's Waterfront and Downtown, February 1999
- City of Bath Comprehensive Plan, 1997
- South End Urban Design Plan, August 2002

Other sources included the Mid-Coast Maine Chamber of Commerce map of the City of Bath and the City of Bath website www.cityofbath.com, interviews with the City of Bath Planning Director, Jim Upham, various comments from Steering Committee members at the Steering Committee Meetings and from the public at the Public Workshop held in the summer of 2003.

Corridor Context Summaries

I. View from the Road

The first impression of the City of Bath is made from the Route 1 Corridor. From the South, the first glimpse, albeit small, is that of the relatively new signature city signs. The motorist is then greeted by the chain link fencing and metal guard rail fencing in the median and the above ground utility poles and wires that line both sides of Route 1. There are multiple and frequent curb cuts to local businesses on either side along the Route 1 Corridor prior to the Downtown Zone. As you approach the Downtown Zone, Route 1 continues onto an elevated structure (viaduct) with views of the Bath Iron Works parking and building facilities. Once on the elevated structure (viaduct), there is no other point of egress to Downtown Bath. From the north, the motorist has views of Downtown Bath and the Waterfront as one crosses the Sagadahoc Bridge. (Refer to Images 1 to 7)

- ***Fencing and Screening Devices***

  Chain link fencing and metal guard rail run all along the highway median in the Commercial Zone. The fencing is unattractive and is, as intended, a physical barrier to vehicular and pedestrian movements east and west of the corridor. The same chain link fence is used for right-of-way security fencing. (Refer to Image 2)

- ***Landscape Plantings and Berms***

  There is minimal planting along the corridor. There is no space available for planting along the Commercial Zone. Landscape outcroppings have occurred along the Route 1 right of ways. (Refer to Images 3 & 8)

- ***Visual Impact of Adjacent Land Uses***

  The adjacent land uses have a considerable visual impact to the corridor. Businesses along the Commercial Zone in some cases have encroached onto the right of way with their parking facilities. These parking facilities have created multiple curb cuts for access (Refer to Image 3). The Bath Iron Works (BIW) facility in the Downtown Zone is an important presence in the city. The physical scale of its facilities with its buildings, ships and cranes provide a gateway feature to the City of Bath from the North. The parking required to accommodate BIW employees has caused encroachment problems in the Downtown Zone (Refer to Image 5).

- ***Signage / Wayfinding***

  The sign at the entry to the city from the south is visually attractive and establishes an identity for the City of Bath. Yet the scale is small in relation to its context (Refer to Image 1). There is no entry sign to the city from the north. The Route 1 Corridor lacks a wayfinding system – both physical and intuitive. The transient motorist will have little chance to acknowledge that they are in the Historical City of Bath. There is only a small sign that indicates this but it is located in an inopportune location because it leaves the motorist little time to make the decision to take the exit to downtown (Refer to Image 4). The only opportunity for motorist to get an extensive view of Historic Downtown Bath is coming south from the north (Refer to Image 7).

- ***Streetscape Components***

  The Route 1 Corridor lacks any streetscape component. Both the Commercial Zone and the Downtown Zone contain retail, office and mixed-use buildings with some residential in the Commercial Zone. Generally, most street frontages do not provide pedestrian sidewalks (Refer to Image 9).

II. Views to the Road

The view to the Corridor is unattractive. The adjacent businesses on either side of the Study Area in the Commercial Zone front onto Route 1. They face a metal guard rail with chain link fencing on top and no landscape areas (Refer to Image 9). In the Downtown Zone, there is an elevated structure, a viaduct. The viaduct lacks aesthetics and has caused a visual, physical and psychological barrier between the east and west. This makes crossing for pedestrians difficult and potentially unsafe because the crossings are unorganized and ill-defined (Refer to Image 12). The Downtown Zone could take more advantage of its historic and vibrant downtown and the viaduct could tie in better architecturally to the Sagadahoc Bridge and its surroundings (Refer to Image 11).

- ***Fencing and Screening Devices***

The same chain link fence is used for right-of-way security fencing. Landscape outcroppings have served as screening for adjacent neighborhoods (Refer to Image 13).

- ***Landscape Plantings and Berms***

Overgrown plantings have occurred along the right of way fencing. There was some effort made to include planting in planter boxes beneath the viaduct in the Downtown Zone, but it is un-maintained, stands empty, and does not tie well with the viaduct architecture (Refer to Image 14).

- ***Visual Impact of Adjacent Land Uses***

The adjacent land uses have an important role in the visual aesthetics of the corridor. Historic Downtown Bath has maintained its historic architecture and storefront businesses but it is only relegated to a few streets. The City of Bath prides itself as 'The City of Ships' with its Waterfront natural resource. However, the adjacent businesses backs up to the waterfront (Refer to Image 15). There could be a better visual connection from the main streets of downtown to the waterfront and the waterfront park (Refer to Image 16).

- ***Signage / Wayfinding***

There are only two signs, similar in size and design as the entry sign, located beneath the Route 1 viaduct to direct you to the historical and cultural amenities in the city (Refer to Image 17).

- ***Streetscape Components***

Route 1 corridor roadway elements lack an aesthetic architectural style unlike the Historic Downtown Bath. Downtown is pedestrian friendly and has an appropriate human scale to its streetscape elements. Elements that are in good to fair condition include brick sidewalks, granite curbs, pedestrian-scaled lighting, street trees, bollards, bike racks, trash receptacles and benches (Refer to Image 18).

<u>Results of Inventory</u>

The City of Bath's rich history and cultural and natural amenities are vital resources to maintain and protect. Drawing upon these resources into the corridor is fundamental to the revitalization of the Commercial Zone and Downtown Zone. The elements depicted from these resources can enhance both the "Views to the Road" as well as the "Views from the Road". With the unified enhancements throughout the corridor, a sense of community and a gateway to the City of Bath will be created.

The attached are images and aerial map to support the visual and character analysis and to locate the community facilities.

VISUAL AND CHARACTER ANALYSIS:

The following are supporting images for the analysis:

Image 1:

The first 'View from The Road' on Route 1 northbound and City of Bath

Image 2:

Route 1 northbound at the Commercial Zone – the corridor is separated by metal beam guard rail and chain link fencing.
Bath city limits.

Image 3:

Route 1 northbound at the Commercial Zone – multiple curb cuts, roadway signs and utility poles and wires inundate the landscape in the Commercial Zone.

Image 4:

Route 1 northbound leaving the Commercial Zone and entering the Downtown Zone – Route 1 continues up on an elevated structure and exit to Historic Downtown Bath is to the right.

Image 5:

Leeman Highway northbound at the Downtown Zone – view of Bath Iron Works facilities – BIW is an important landmark in the city and the landscape.

Image 6:

Route 1 northbound leaving the Downtown Zone and the City of Bath – view of the Carlton Bridge on the right and the parallel Sagadahoc Bridge on the left.

Image 7:

Route 1 southbound and entering the City of Bath from the Sagadahoc Bridge – gateway sign is lacking but views of the Historic Downtown Bath are extensive.

Image 8:

Plant outcroppings have occurred along the Route 1 right of way.

Image 9:

Adjacent business front onto the Route 1 corridor.

Image 10:

"The Viaduct" as referred to the elevated bridge structure of Route 1.

Image 11:

The Sagadahoc Bridge connecting the City of Bath and Town of Woolwich.

Image 12:

Pedestrian crossing at ill-defined crossings.

Image 13:

Landscape outcroppings serving as screening of Route 1 to the adjacent neighborhood – view to the Route 1 on-ramp from High Street.

Image 14:

Empty wooden planter boxes staged underneath the Route 1 viaduct.

Image 15:

Local businesses back up into the waterfront – looking west on Commercial Avenue.

Image 16:

Beautiful waterfront park.

Image 17:

Wayfinding signs located beneath the Route 1 viaduct provide direction to local cultural amenities.

Image 18:

Streetscape elements found in Historic Downtown Bath.

April 7, 2004

TO: File

FROM: Bruce Hyman, AICP

SUBJECT: MaineDOT
Bath Feasibility Study
MaineDOT PIN # 10123.00
Economic Development: Existing

Wilbur Smith Associates

TECHNICAL MEMO

Purpose

The purpose of this Technical Memorandum is to provide information related to the Economic Development context of the Route 1 Corridor on Bath and environs.

Methodology

Information regarding Economic Development was collected through:

- Assembly of previous and ongoing plans and studies for the Route 1 Corridor from known/identified sources
- Public forums/meetings held early in the study process
- Discussion with City of Bath officials, including Jim Upham and John Bubier

Information Sources

Reports, plans and data gathered included:

- Retail Sales Data for 2002, Maine Revenue Services, State of Maine, 2/25/03.
- Center for Business and Economic Research, University of Southern Maine, 2003.
- Final List of Service Centers, Maine State Planning Office, November 2002.

Baseline Information

Service Center Communities

Service Center Communities “share three attributes: a) they are job centers -- importing workers, b) they are retail centers -- with sales exceeding the needs of the local population, and/or c) they offer an array of social, cultural, health and financial services to the surrounding region. Service center communities are urban in function, but not necessarily in form or scale. They act like cities, but don't always look like them. “

“Four basic criteria were used to identify the municipalities in Maine that serve as centers: the level of retail sales, the jobs to workers ratio, the amount of federally assisted housing and the volume of service sector jobs. Consideration was also given to the geographic distribution of municipalities so that communities were identified that serve as small (local) centers as well as large urban places that serve as primary (major) centers. Factors such as trade were weighted to regional/ local figures to help identify small centers. " (www.state.me.us\spo)

Bath is identified as one of 63 statewide Service Centers. Bath's indices of ranking relative to other communities are high in the areas of Jobs:Worker ratio (2.5) and the index of Public Housing (3.5) but lower in the areas of Retail Trade (0.76) and Service Sector (0.38). Indices of over 1.0 indicate a higher orientation to being a service center; indices lower than 1.0 indicate lower orientation in a particular service center indicator.

The neighboring communities of Brunswick and Topsham directly influence Bath's role in the regional economy. Brunswick (also a Service Center) has indices of over one for all four service center indicators (Jobs:Worker ratio, 1.5; Retail Trade, 1.7; Service Sector, 1.4; and Public Housing, 1.5) Topsham's index (a Contiguous Census Designated Place, a lower category of center) is higher than Bath's in the area of Services, at 0.75, but lower in the other three categories. (Final List of Service Centers, State Planning Office, November 2002).

Both Bath and Brunswick serve the retail, personal services and governmental service needs of the year round residents of surrounding communities and the high summer seasonal population.

Economic Forecasts

Economic Forecasts.

The Maine State Planning Office presents a mixed economic forecast for Sagadahoc County, of which Bath is the county seat. The most recent Maine County Economic Forecast concludes:

> *Sagadahoc County presents a major exception to this pattern [the coastal counties having generally faster population and economic growth] as it is a coastal county yet it experienced employment and retail sales declines in the 1990's. The short term dynamics behind the data are the downsizing of Bath Iron Works, the County's largest employer, and the rapid growth of the Cook's Corner Shopping Mall which is just over the County border in Brunswick (Cumberland County). This mall definitely siphoned off some retail activity from the Bath area of Sagadahoc County* (SPO, June 2002).

While the Cooks Corner area is cited above, the rapidly expanding Topsham Fair Mall area (in Sagadahoc County) is also greatly affecting retail and overall employment growth trends in the Greater Bath Area.

The SPO County forecast to 2010 shows Sagadahoc County as the only county expected to show a job loss (-1.4%) from 2000 job levels in contrast to the statewide growth of +1.7%.

Employment & Population Estimates and Forecasts.

Employment

The Maine Department of Labor estimates that there were 10,611 jobs in Bath in 2000. The number of service jobs was estimated at 890 (Data for Calculating Regional Service Centers, SPO, October 2002). Approximately 6,500 of these were at Bath Iron Works, accounting for approximately 65% of total employment in the City of Bath.

Population

Bath experienced a decline of 5.4% in population from 1990 to 2000 . The population in 2000 was estimated to be 9,266, down from just under 9,800 in 1990 (US Census, 2000).

The State Planning Office forecasts Bath's population will remain essentially unchanged over the fifteen year period, 2000-2015 (to just over 9,200). The SPO forecasts an increase of just over 1% (approximately 3,000 persons) for Sagadahoc County over this same time frame. (Forecast of Maine State/County/City/Town Populations, SPO, December 2001).

<u>Retail Sales Data</u>

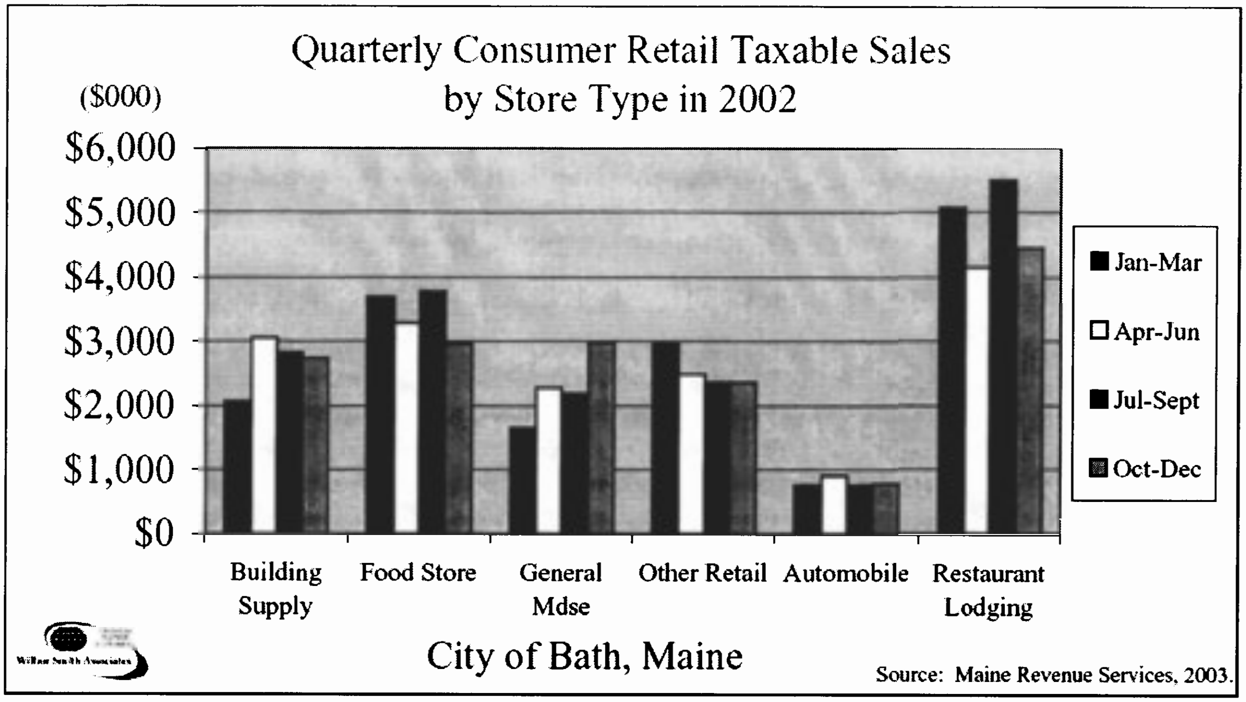
Consumer Retail Sales Data is one indicator of the vitality of a local economy. The State of Maine collects and publishes this data for six major categories of store type for the calendar year and individual quarter. Examining the quarterly data can reveal degrees of seasonality in the retail economy of the community. The Consumer Retail Taxable Sales data for Bath in 2002 by quarter are shown in Figure 1, page 4 of 5. The data shows the largest group of sales in the 'Restaurant/Lodging' category, accounting for 29% of total annual taxable sales. The next highest category is 'Food Store' at 21% of the annual sales total.

Overall taxable sales showed quite little variation by quarter, or seasonality, but there is greater variation within some store categories. The 'General Merchandise' and 'Restaurant/Lodging' categories show the greatest seasonality as might be expected (due to the influence of fourth quarter holiday shopping and tourism, respectively, in these categories. For 'Restaurant/ Lodging', the third quarter (July to September, the peak of the summer tourist season) accounts for 29% of total annual sales in this category.

Bath is part of the Brunswick Economic Summary Area (ESA) encompassing 27 municipalities, including Brunswick, Topsham, Woolwich, Wiscasset and the peninsula communities bounding the east and west banks of the Kennebec River. An important indicator of Bath's relative health and economic standing is its share of consumer sales in the region relative to its neighbors.

Bath's overall share of consumer retail sales during the period 1996 to 2002 has declined from a high of 14.4% (in 1997) to 12.3% in 2002. The lowest percentage share of total ESA sales was in 2001 at 11.5%. During this period, Bath's share of sales by 'General Merchandise' stores increased from 6.8% in 1996 to 7.8% in 2002. In the 'Other Retail' store category, Bath's ESA share declined from 21.7% in 1996 to 18.4% in 2002 (with a low of 16.7% in 2001). 'Restaurant/Lodging' in Bath accounted for 22% of ESA sales in 2002, up from a low of 18.6% in 1996.

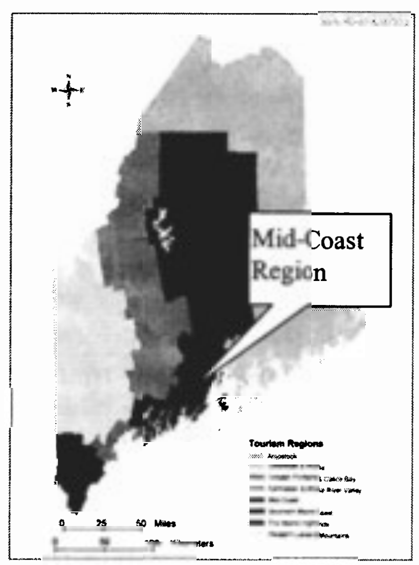
Figure 1



Tourism Travel

Bath is the gateway to the Mid-Coast Region, one of eight distinct tourist regions identified by the State of Maine Office of Tourism. Statewide, fifty-nine percent of overnight tourist trips take place in the months of July to September with the largest out of state sources of these travelers being Massachusetts (40%), New York (12%) and New Hampshire (8%). Seventy-two percent of tourist trips in Maine were made by private automobile. Eco-tourism was the major draw to Maine for 21% of trips.

Figure 2
Mid-Coast Maine Tourism Region



Source: Office of Tourism.

The Mid-Coast region was the fourth most popular destination at 25% of all overnight tourist trips. The Southern Coast (44%), Greater Portland/Casco Bay (35%) and Downeast Acadia (28%) ranked ahead. (Travel and Tourism in Maine: 201 Visitor Study, Longwoods International, 2002) (Most trips visited more than one region so totals are more than 100%.) The combination of Mid-Coast and Downeast tourist trips forms the existing base of tourism trips that Bath could more effectively capitalize upon.

Major destinations of visitors to Bath include the Maine Maritime Museum, the Downtown Bath shopping district, the Kennebec River, the Chocolate Church Art Center, Bath Iron Works and the Downtown historic district.

<u>Community Meetings Regarding Economic Development Context of Route 1</u>

Two community meetings were held on May 21 and 22, 2003 to discuss with the Bath business community their perceptions, issues and concerns related to the role of Route 1 in the economic vitality of Bath. The meeting on May 21st invited business and property owners of the Commercial Zone of Route 1 west of High Street to attend. The May 22nd meeting focused on the Downtown Zone business and property owners. Invitations were sent to business and property owners using mailing labels provided by the City of Bath. Notes from the meeting are attached.

There were several general consensus 'findings' from the meetings.

Commercial Zone (based upon limited input/meeting attendance):

- Lack of vehicular and pedestrian access across Route 1 hinders businesses and residents in the area.
- The past problems of traffic backups have been essentially resolved since the opening of the Sagadahoc Bridge. Any 'solutions' should not create new traffic backups.
- Parcel configuration in the Commercial Zone restricts the scale of development.

Downtown Zone:

- The southerly section of Route 1, from West Bath town line to High Street, is a major concern and impediment to increased visitation.
- A reconfigured Route 1 must increase the visibility and accessibility from Route 1 to Downtown.
- A reconfigured Route 1 should provide increased access to the Downtown but should not inhibit through traffic.
- Traffic speeds on Route 1 are currently a problem and a reconfigured Route 1 should address this problem.

'Route 1 & Economic Development' Roundtable: Route 1 West Meeting
May 21, 2003

Attendance: 2 businesses attended.

Consultant Team & City Staff: Arno Hart, WSA; Bruce Hyman, WSA; Irene Hauzar, HNTB; Jim Upham, City of Bath.

Background
The meeting was held at the Holiday Inn located on Route 1. A brief overview of the purpose of the study and the purpose of the meeting was provided.

An informal discussion of issues regarding Route 1 was held with the two businessmen in attendance.

Comments/Questions

Is traffic going to be forecasted? [Yes] Would the road be able to hold that amount? [No analysis of future years has been conducted yet.] Does the study look at the Route 209 Bypass? [Yes] Will the High Street Ramp be studied? [Yes]

The traffic moves really well now; the new bridge has helped. Has concerns that construction of whatever is built will be bad for traffic and be bad for business.

Is aware that many businesses have encroached into the Route 1 Right-of-Way now.

A sidewalk along Route 1 would be useful and safe. The path in front of the Holiday Inn is trampled [indicating need for sidewalk]. A sidewalk would be good for business. A pedestrian connection across Route 1 from the hotel to the Bath Shopping Center would be good for businesses. Hotel has several long term guests with Navy Base nearby and BIW in town.

Access across Route 1 [west of High Street] would help hotel guests to get to businesses across the highway. VIP has purchased the First National Bank parcel across from the hotel.

The fence is needed for safety; not the most aesthetic feature.

Lack of access across highway hurts businesses on each side.

Traffic slowdowns as a result of slow traffic across the bridge impacts business viability at the western end of the corridor (cars don't want to get out of the queue and have to get back in); traffic flow over the bridge is a key concern. Free flow of traffic is the key issue for the west end of the corridor.

Does not expect new convenience stores and gas stations along this segment. There are vacant lots for other types of development, potentially retail, for instance. Available lots are not very big to allow for large development, nor large enough to allow for ingress/egress.

85% of business (at gas station) is repeat destination business; only 15% is pass-by. Convenience stores tend to have more pass-by or transient business.

For visitors that do stop at his business, the most asked question is: "Where is Maine Maritime Museum?"

'Route 1 & Economic Development' Roundtable: Downtown Meeting
May 22, 2003

Attendance: 38 persons signed the sign-in sheet. Probably 20+ people did not sign in. (Sheets attached).

Consultant Team & City Staff: Arno Hart, WSA; Bruce Hyman, WSA; Randy Armour, WSA, Irene Hauzar, HNTB; Doug Mann, HNTB; Tricia Woliver, HNTB; Jim Upham, City of Bath.

Background

The meeting was a jointly hosted meeting of the Bath 'Business Barometer' group and representatives of the consultant team for the Bath, Maine, Route 1 Feasibility Study being conducted by the Maine Department of Transportation.

Representatives of the Business Barometer group began the meeting with a discussion of the results of visitor and resident intercept studies conducted in downtown Bath in 2002/2003. The survey results were disaggregated to include Visitors (100 respondents) and Area Residents (337 respondents). Handouts were distributed. Discussion followed the presentation.

Roundtable

Jim Upham, Director of Planning, City of Bath, welcomed everyone and introduced the consultant team.

Bruce Hyman from Wilbur Smith Associates discussed briefly the background and purpose of the meeting. The study is being conducted by the MaineDOT in collaboration with the City of Bath. There is a study Advisory Committee made up of Bath residents, businesses, elected/appointed officials and other interested stakeholders that will be advising the MaineDOT. The purpose is to study the engineering feasibility of a number of potential options for the Route 1 corridor through Bath. The purpose of this morning's meeting is to discuss the relationship of Route 1 to economic development/vitality in Bath, with specific emphasis on downtown businesses. Bruce explained that a separate meeting was held last evening for businesses outside of the downtown along Route 1.

Arno Hart, Senior Economist from Wilbur Smith, summarized his 'findings' from Business Barometer survey. 1) Bath visitors and residents highly value the 'look and feel' of the downtown; 2) Bath visitors and residents want to see more 'variety' in the products, services and amenities (waterfront, etc) offered; 3) The downtown's 'competitive edge' is in specialty outlets -- retail, restaurants, services, and complementary recreation.

Arno then opened the floor up for responses to the general question of 'how is Route 1 important to the downtown'?

Comments/Questions from Public

#1. Waterfront in Bath is not like a bay; it's a major river with a current; development along it is difficult. Railroad is essential to the future of Bath; don't do anything to impede its future. The new signals on Route 1/Washington/Centre Streets are working well.

Visitors from outside: lots of foot traffic but very little buying. Local people are the important market and need to be preserved. Parking is not bad; on-street parking generally available. The main reason people shop in downtown is 'quality products'. Doesn't want Bath to become sophisticated. Lack of polish adds to its charm/character. Artists are a big part of the area's attractiveness; they need/deserve more recognition. Like the "fun" of the viaduct.

#2. Access from the north is difficult/a "disaster". Need better signage. Fix traffic problems in Wiscasset before you fix Bath.

#3. Currently, Bath is seasonal. Likes views of Bath from the North; views approaching from South are poor/appearance poor. Low visual connection to the downtown Northbound. Access could be simpler. Doesn't want franchises in downtown Bath; would kill downtown. There are lots of great things about Bath now; these need to be remembered. Currently can drive by downtown Bath and not know it's there.

#4. Doesn't want Bath to "be a Bar Harbor"; Bath is unique now and we need more unique places. Need a balance in our approach.

#5. Bath is a service center to the two peninsulas. People come to get away from the Big City and Traffic. There is big growth in the retirement population in the area.

#6. Access to downtown is extremely important. There are an increasing number of people commuting to Portland area. Bath could capture more business from peninsulas if there was better access and could capture more through traffic as well. There needs to be more connection/synergy between the downtown and the Maritime Museum. There are currently two barriers to this: Route 1 and BIW.

#7. Business downtown would double if Northbound Route 1 flowed better and 'eyesores' were improved. Goal should be "easy, accessible and visually pleasant". Focus of effort should be on West Bath Extension/New Meadows Road area.

#8. Traffic has cleared up since Sagadahoc Bridge opened. Whatever happens, "give people a good choice and access (to downtown) but don't slow them down".

#9. Business owner that listens to his customers and they say access is difficult. Access is not an issue Southbound; Northbound it's an issue. Brunswick could be a bigger market if access was better. The 6,000 BIW employees are all potential customers/a big market. Easy access for walking under/across Route 1 is important. A route for BIW access is important. Emphasize pedestrian connections.

#10. Giving directions for the Northbound direction to downtown is difficult. The circulation system from Northbound Route 1 is confusing.

#11. The viaduct makes it difficult to get customers. They've gone by for years.

#12. There is currently a nearly 0% vacancy rate downtown. With the growth in big box retailing, the pressure on the downtown is going to be intense. Preserving the adjacent neighborhoods to the downtown is critical.

#13. Attended a national downtown organization conference recently and the message there was that downtowns cannot be complacent; they must take a pro-active stance; things related to markets, preferences, downtowns are always changing. The viaduct may have been the best solution at the time it was designed/built.

#14. The 0% vacancy rate is partly a myth. Rents downtown are 'subsistence-level rents'. There is no rush to pay higher rents for downtown space. The low vacancy rate is not all positive.

#15. Look at impacts of Route 209 bypass, industrial park in Woolwich and traffic impacts of industrial park in West Bath.

#16. Concerned over at-grade alternative. Through traffic would tie up local traffic and vice versa. If you could keep traffic flowing, the at-grade would be okay.

#17. Viaduct is a 'bypass' for through traffic. Make it attractive from West Bath to the bridge.

#18. Traffic is so much better since the bridge opened. It would be a mistake to stop all traffic; through-traffic has got to go through; don't make things worse.

#19. What would happen at Middle Street?; nearly needs a traffic light now. What would be the impact of grade separation on Middle Street? You could narrow Frontage Roads to one lane wide to reduce traffic speeds. Middle at Frontage Roads a safety problem now.

#20. Traffic moves quickly now. Wrong-headed to slow traffic down to capture market. We can build the attractions to build the market. Make it easy to access downtown.

#21. Speed is an issue on the viaduct. Currently, some traffic goes 65mph.

HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005.513 **Date:** March 17, 2004

From: Irene Hauzar

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Neighborhood and Community Cohesion

Methodology

Information on community cohesion within the Study Area was obtained from the City of Bath Planning Department and through discussions with City of Bath Planning Officials. Field reconnaissance was conducted for this component of the study, however discussions with residents were not conducted for purposes of this feasibility study.

Information Sources

The 1997 City of Bath Comprehensive Plan, The Action Plan for Bath's Waterfront and Downtown, 1999, and the South End Urban Design Plan, 1999 were reviewed.

Baseline Information

A figure depicting the locations of Bath neighborhoods is found on page 5 of 5.

One of the strengths of the City of Bath is in the integrity of its neighborhoods. Several forces have created both positive and negative changes in Bath's neighborhoods. Negative changes include apartment conversions from single family dwellings, inappropriately high housing densities, loss of local stores, inappropriate commercial encroachment, lack of open space, architectural impact, and property deterioration. Positive changes that have taken place are new economic investment, construction of new sidewalks and curbing, improved landscaping, sidewalk connections to schools and parks, and stable property values.

As stated in the City of Bath Comprehensive Plan (1997), there is a concern with the amount of conversions of existing dwellings into multi-family units. However, changes to zoning regulations adopted in 2000 have for the most part brought an end to this type of conversion. The sense is that neighborhoods, particularly those in decline, were allowed to develop too densely. Goals outlined in the City of Bath Comprehensive Plan that pertain to community cohesion include:

- control the conversion of single-family homes to multi-family homes through revisions to zoning ordinances
- historic renovation and rehabilitation should be encouraged to make neighborhoods attractive and to add to the tax base by maintaining or increasing property values
- alter zoning to allow for home-based businesses without altering the character of the neighborhood
- increase connects to and from neighborhoods by providing sidewalks to parks

- site more housing for disadvantaged residents, including halfway homes and group homes.

Discussions with the City of Bath Planning Director indicated that the neighborhood dynamic in the City of Bath is very strong. Residents have a strong affiliation with where they live and the resources that are found within their neighborhoods. Residents have a sense of belonging with a particular area of Bath and have civic pride in where they live.

The City of Bath is divided by the Route 1 highway corridor. In places, Route 1 is not only a physical barrier, but it is also a psychological barrier. The dividing line between the north end of the City of Bath and the south end was historically Centre Street, prior to the construction of the Route 1 viaduct in 1957. Historically, ship owners, captains, and shipping company owners lived on Washington Street, away from the shipbuilding activity, and craftsmen and workers lived near the shipyards in the south end of the City of Bath. The construction of the Route 1 viaduct became the new dividing line between the two areas of the city.

Neighborhoods North of Route 1 and East of High Street

The neighborhoods located north of Route 1 and east of High Street include the Downtown Bath, Washington Street North, and Library Park neighborhoods. These downtown neighborhood homes are typically larger than those in the rest of the City of Bath. Many single family homes were built by ship captains and reflect the wealth that existed in this area during the early to mid nineteenth century. The downtown residential neighborhoods have unified architecture and scale, and represent Greek Revival, Federal, and Colonial Architecture. Many of the streets are wide, allowing for on-street parking on one or both sides. Bath's downtown neighborhoods (Downtown Bath, Washington Street North and Library Park) are experiencing "commercial creep", as commercial uses are encroaching upon residential neighborhoods. These downtown neighborhoods are connected to the downtown commercial area by sidewalks, which are viewed as an asset to the current residents. These neighborhoods currently contain a mixture of residents from different economic backgrounds.

The Downtown Bath neighborhood residents have many places to meet and be social. The various restaurants and coffee shops on Front Street provide a safe and comfortable location for neighborhood residents to walk to and meet with each other. In addition, residents from these three neighborhoods have the option to walk to many community facilities, including the library, city hall, and the waterfront park. These places give residents many opportunities to meet and socialize.

The Washington Street North neighborhood is characterized by its small residential lots. The single family homes were built on small lots in a dense pattern. Many of the lots abut the existing rail right-of-way that traverses downtown Bath. The residents in this neighborhood are able to walk to the nearby downtown commercial area, and other community facilities such as the Chocolate Church Performing Arts Center and the U.S. Post Office. Residents in this neighborhood often associate themselves with the Downtown Bath neighborhood.

The Library Park neighborhood contains mostly large single family homes, which have historically been occupied by sea captains when the homes were originally constructed. Today they are occupied by families and empty-nesters. Empty nesters are usually older parents that have raised their families in a single family home, the children have since grown up and moved out, and the parents find themselves living in a home with empty bedrooms. In some cases these people are "overhoused" because they have more rooms than they need. However, these residents enjoy the benefits of living adjacent to a public park and library.

Neighborhoods located north of Route 1 within the Route 1 commercial zone contain many home businesses scattered throughout largely single family residential neighborhoods. This type of land use is allowed by current City of Bath Zoning Ordinances.

Neighborhoods South of Route 1 and East of High Street

Neighborhoods located south of Route 1 and east of High Street, adjacent to the Bath Iron Works (BIW), reflect the housing of the shipbuilders that have operated in the vicinity of BIW for nearly 200 years. This location contains high density residential development that was historically occupied by workers at BIW and its predecessor. Today, many of the single family homes in this area have been converted into multi-family homes and are occupied by residents that are employed throughout the region. Some of the neighborhoods located south of Route 1 have recently been included as part of the South End Historic District. However, this designation has not yet resulted in a Historic Overlay zoning district by the City of Bath.

There are several small neighborhoods located south of Route 1. The High Street neighborhood contains homes set well back from the road. High Street is a wide roadway that has high traffic volumes. The high traffic volumes hinder a strong neighborhood cohesive feeling from residents along this street. Increased traffic often leaves residents with a feeling of segregation, because crossing the street often is challenging and dangerous, especially for children and the elderly. High Street acts as the gateway into the south end of Bath.

Upper Middle Street neighborhood begins south of Route 1 and extends to the Fisher Mitchell School (Russell St). There is a mixture of renters and owners residing in this neighborhood of single family homes. This neighborhood experiences a change in residents with renters moving in and out of the neighborhood, and is therefore less cohesive than a neighborhood with a majority of owner occupied housing. There are several small parking lots located throughout the neighborhood that are utilized by BIW workers. The neighborhood has limited views of the Kennebec River.

The South Street neighborhood contains mostly historic homes, located on large lots. There is some conversion into commercial uses occurring within this neighborhood. These homes are oriented towards the river. Often this neighborhood experiences large amounts of cut-through traffic mainly by Bath Iron Works (BIW) employees looking for a shortcut to the main gates of BIW. The traffic volumes experienced in this neighborhood during the evening shift change at BIW hinders a strong neighborhood cohesive feeling.

The Washington Street South neighborhood is an extension of the South Street neighborhood. This neighborhood contains a mixture of large and small lots. Most of the homes are oriented towards the river. Residents within this neighborhood have to contend with the heavy traffic volumes on Washington Street during the shift change at BIW and also during the summer months when tourists travel down Washington Street to the recreation areas outside of Bath.

The Fisher Mitchell School neighborhood contains mostly single family housing abutting an electric power corridor. The focal point of this neighborhood is the Fisher Mitchell School, which serves as a meeting place and recreation area for neighboring residents.

Neighborhoods South of Route 1 and West of High Street

South of Route 1 and west of High Street are the Richardson, Western Avenue, and the Redlon Road neighborhoods. These neighborhoods contain densely developed single family homes and condominiums. These neighborhoods experience large amounts of cut-through traffic mainly by local traffic looking to by-pass Route 1 congestion. These neighborhoods have demonstrated a strong neighborhood cohesive character by coming together to represent itself against various development proposals over the past few years.

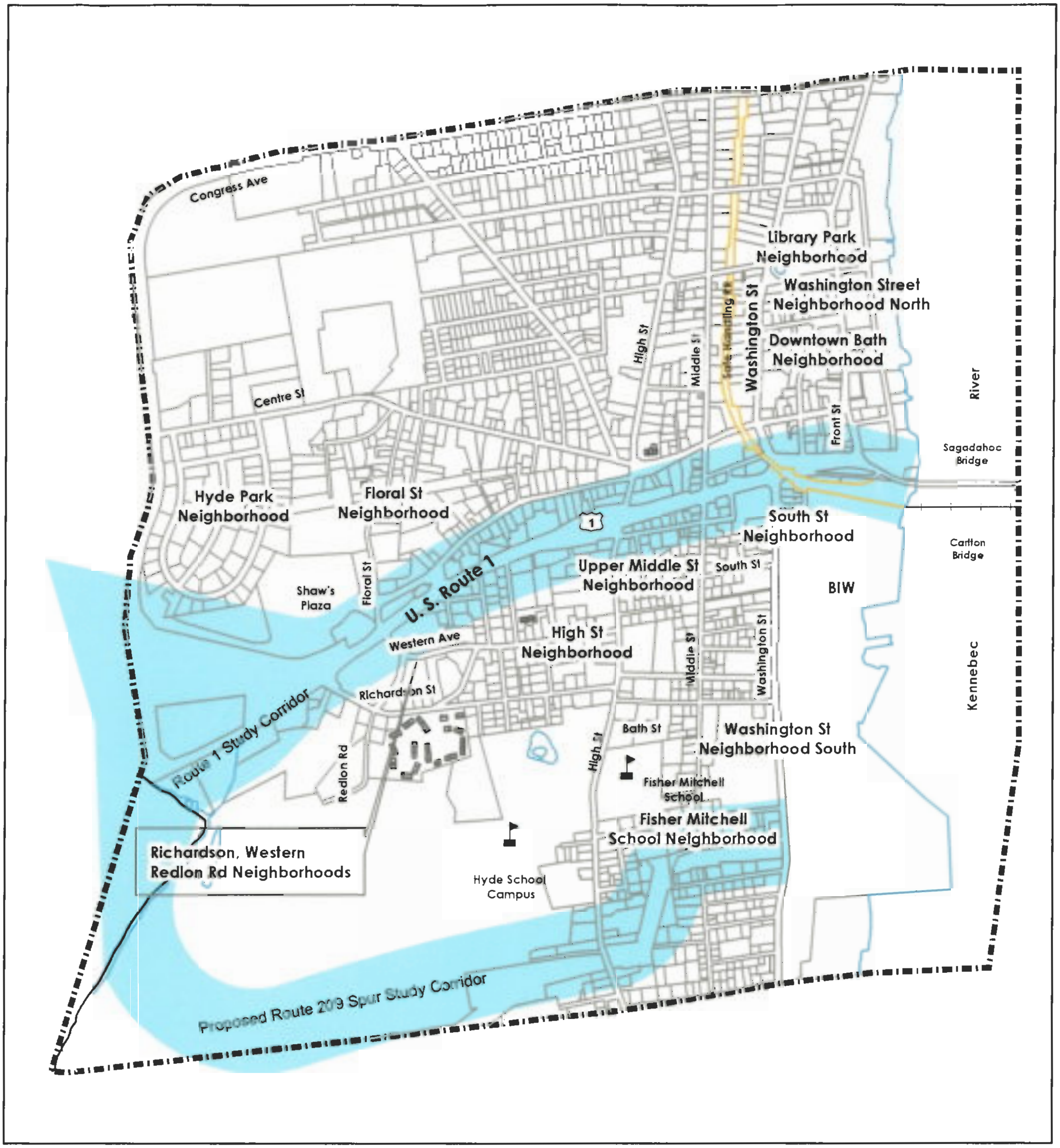
Neighborhoods North of Route 1 and West of High Street

Along the Route 1 commercial area (west of High Street) are mainly single family houses with many have been converted into multi-family housing. Neighborhoods located north of the Route 1 commercial area include the Floral Street neighborhood. The Floral Street neighborhood is characterized by small lots. This neighborhood is undergoing some economic difficulties, and has been struggling in recent years. Some homes are in need of repair. This neighborhood has demonstrated community cohesion in recent years when faced with development proposals that create traffic issues within their neighborhood.

Located north of the Shaw's Plaza is the Hyde Park neighborhood. The Hyde Park neighborhood was constructed after World War II and consists of brick duplex housing. It was constructed by the federal government. This neighborhood is mainly occupied by young families, due to its affordability. Most of the housing in this neighborhood is rented. Although this neighborhood is mostly composed of rental units, the existence of families lends this neighborhood to be cohesive. The commonality of children amongst the renters creates a cohesive neighborhood.

Results of Inventory

Study Corridors 500 feet wide were delineated within the immediate area of Route 1 and along one potential alignment of a new Route 209 Spur. The following figure illustrates the neighborhoods along and adjacent to these corridors. The southern end of the Floral Street neighborhood is in the Route 1 Study Corridor. In addition, the Richardson, Western, and Redlon Road neighborhoods are within the Route 1 Study Corridor. The Fisher Mitchell School neighborhood is within the Route 209 Spur Study Corridor.



Study Area

Study Corridor

Roadways

Property Lines

Bath Feasibility Study Neighborhoods

Maine DOT PIN 10123.00

0 250 500 1,000 1,500 2,000 Feet

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Technical Memorandum

To: File: 36527-PL-001-005.513 **Date:** March 5, 2004

From: Irene Hauzar

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Public Parks and Recreation Inventory

Methodology

Information on public parks and recreation in the Study Area was obtained by requesting file searches by state agencies, researching Geographic Information Systems (GIS) data from the Maine Office of GIS, reviewing the 1997 City of Bath Comprehensive Plan, and reviewing the City of Bath website www.cityofbath.com. In addition, personal communication with City of Bath Officials were conducted. Limited field reconnaissance was conducted for this component of the study.

Information Sources

The Maine Department of Conservation (DOC)-Bureau of State Parks was contacted for information pertaining to parks and recreation lands that currently exist in the Study Area. The Maine DOC replied with a letter and email correspondence that indicated where Section 6(f) properties were located within the Study Area.

Baseline Information

Attached on page 3 of 3, is a figure depicting the public park and recreation facilities within the Study Area.

There are two properties in the Study Area that were partially funded by the Land and Water Conservation Fund Act of 1965 (LWCF). These properties fall under the protection of the LWCF Section 6(f) regulation that affords special protection to recreational resources that have been purchased or improved with LWCF funds. This regulation restricts the conversion of lands acquired or developed with LWCF assistance to uses other than public outdoor recreation uses.

The two Section 6(f) properties within the Study Area are located at the Bath Waterfront Park. The first Section 6(f) property is an extension of land at the Bath Waterfront Park that was purchased to give the City of Bath a larger park that would be available for future recreation facility development. This parcel is 1.6 acres in size. The second Section 6(f) property is the Bath House (restroom facility). This parcel is 0.5 acres in size. There are no other Section 6(f) properties in the Study Area.

Section 4(f) of the U.S. Department of Transportation Act (1966), states that publicly owned parks, recreation lands, wildlife and waterfowl refuge areas, or historic sites of national, state or local significance may be used for Federal Aid projects only if there is no feasible and prudent alternative to the use of such land. A Section 4(f) Statement is required when a federally funded transportation action may have an adverse effect on a historic or public recreational resource.

The City of Bath Recreation Department provides recreational and leisure activities to the residents and visitors of the City of Bath. The City of Bath Recreation Department maintains two municipal parks within the Study Area, the Patten Free Library Park and the Waterfront Park. These public parks offer passive recreation opportunities. The Patten Free Library Park is approximately 3.8 acres in size, and it is located at the intersection of Washington Street and Summer Street. The Waterfront Park is approximately 2.1 acres total in size and is located between Commercial Street and the Kennebec River. These public properties are subject to Section 4(f).

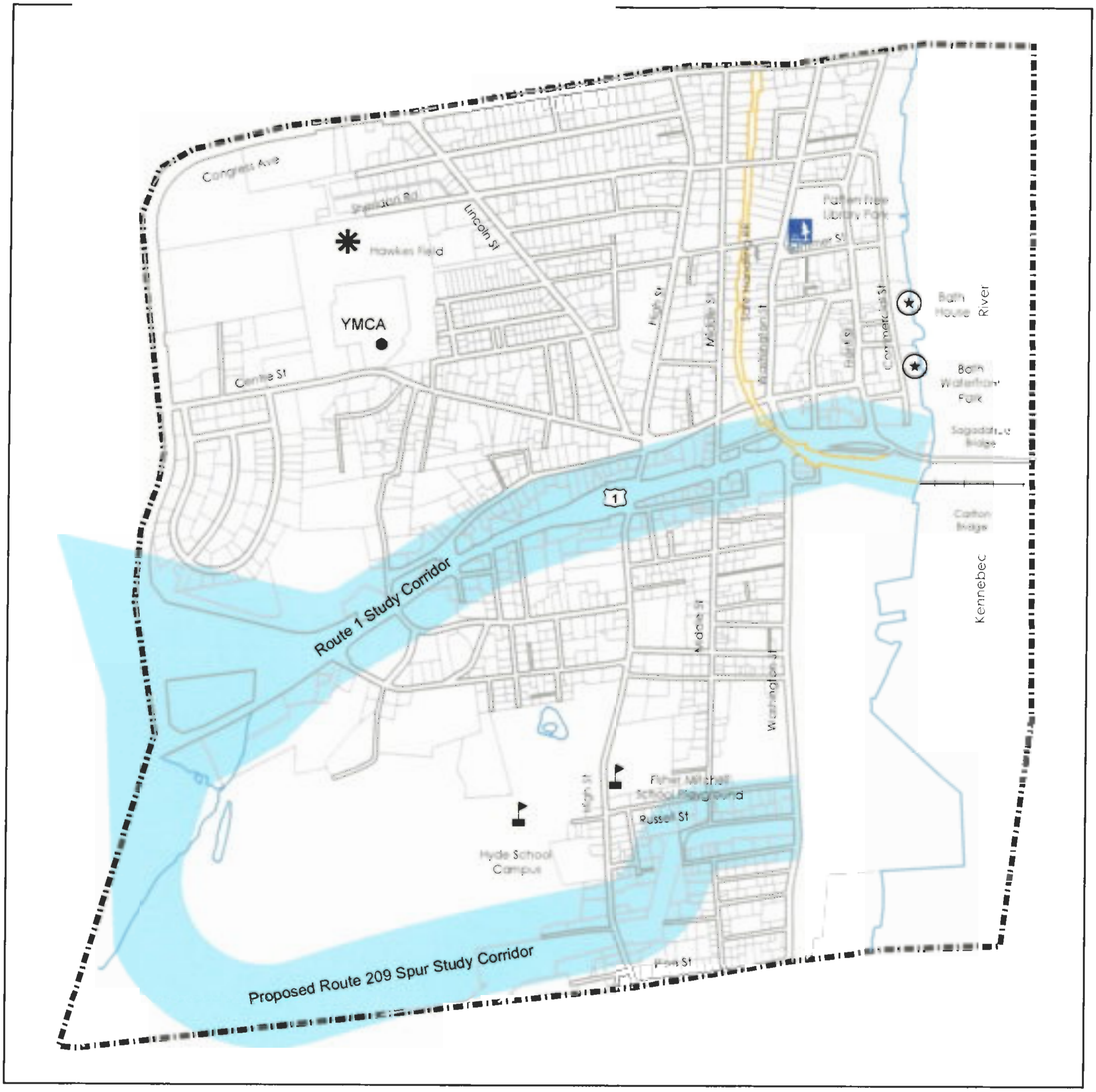
There is one playground within the Study Area, located at the Fisher Mitchell School, located at the intersection of High Street and Russell Street. The facilities available at this playground including climbing equipment, swing sets, a basketball court, and picnic tables. Another recreational facility found within the Study Area is Hawkes Field, accessed by Sheridan Road. Hawkes Road is maintained and operated by the City of Bath Recreation Department. Hawkes Road contains a basketball diamond and a soccer field. These public properties are subject to Section 4(f).

In addition, the Hyde School, located near the intersections of High and Russell Streets, contains three multi-purpose fields that are accessible to residents to the City of Bath. These multi-purpose fields include a football field, soccer field, and track field. This private property is not subject to Section 4(f).

Recreational facilities within the Study Area also include the YMCA. The YMCA is located north of Centre Street, west of Lincoln Street. Facilities include a pool, gym, climbing wall, hot tub and sauna to members. This facility was recently expanded and is considered to be an asset to the residents of the City of Bath. As a private facility it is not subject to Section 4(f).

Results of Inventory

Study Corridors 500 feet wide were delineated within the immediate area of Route 1 and along one potential alignment of a new Route 209 Spur. As illustrated on the attached Figure on page 3 of 3, the athletic fields at the Hyde School are close to, but not within the 500 foot wide Route 209 Spur Study Corridor. All other parks and recreation areas are outside of the study corridors.



Study Area

Roadways

Property Lines

6(f) Properties

Hawkes Field

School Recreation Facility

Patten Free Library Park

Study Corridor

Bath Feasibility Study
Public Parks and Recreation

Maine DOT PIN 10123.00

Feet

0 250 500 1,000 1,500 2,000

HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005.513 **Date:** March 8, 2004

From: Irene Hauzar, Sheryl Campbell

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Right of Way and Property Inventory
Preliminary Impacts and Estimated Acquisition Costs

Methodology

Information on right of way and property in the Study Area was obtained through the 2003 Geographic Information System (GIS) property files from the City of Bath Assessor's Department. Property information for the Town of West Bath was obtained through the Assessor's Department and includes the 2001 Town of West Bath tax maps and the 2002 property database. The preliminary property acquisition costs were estimated based on the assessed value of both the land and buildings. Personal communications with City of Bath and Town of West Bath officials were conducted. Limited field reconnaissance was conducted for this component of the study.

For the Route 1 roadway options, proposed property impacts were determined by overlaying each option's proposed right of way limits over the current Route 1 alignment and right of way. For purposes of estimating property impacts, it was assumed that widening would occur on both the north and south sides of Route 1. If the proposed right of way limit encroached upon a building, the value of the building was included in the total property impact calculation for each option. The proposed Route 1 right of way varies, and was kept to a minimum because this corridor is densely developed.

For the Route 209 Spur Option, a limited access right of way was assumed at 100 feet wide from State Road to High Street and 80 feet wide from High Street to Washington Street.

For the rail options, property impacts were determined by overlaying the proposed rail right of way over the current property database. For the Town of West Bath, the rail options were superimposed over the tax maps to determine the rail right of way impacts. A 50-foot railroad right of way was assumed.

Spreadsheet calculations for the property impact area and preliminary right of way acquisition costs for each option are attached. These acquisition costs have been rounded up to the nearest ten thousand dollars.

Information Sources

The City of Bath Assessor's Department provided GIS files that contained the assessed value of both the land and buildings for each parcel located in the Study Area. This data was current as of April 2003. In some instances, the City of Bath Assessor's Department was contacted to verify the data that was contained within the GIS database.

The Town of West Bath Assessor's Department provided paper copies of their tax maps. The Town of West Bath property database was obtained through the Town of West Bath website, westbath.govoff.com. This data was current as of September 2002.

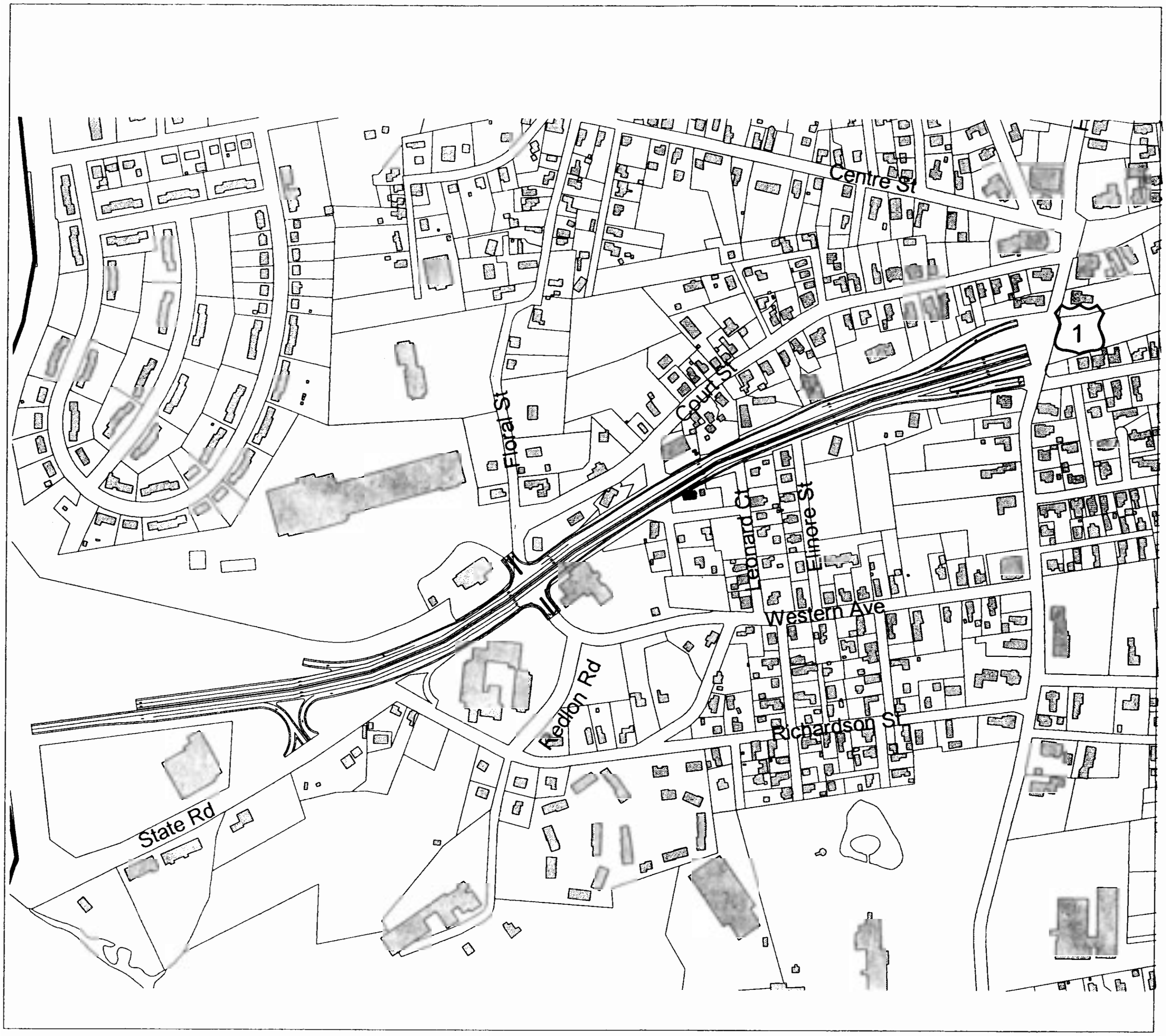
Baseline Information

Existing right of way and property lines are illustrated on the attached figures in Appendix A. These figures also illustrate structures that would need to be acquired, based on the conceptual design.

Property Impacts and Estimated Acquisition Cost

The following table summarizes the anticipated property impacts and estimated property acquisition costs for the options that were carried forward past the initial screening. Note that Rail Option 3 runs along the existing railroad right of way, therefore anticipated property impacts will be negligible.

Option	Estimated Number of Structures to be Acquired	Estimated Land Area to be Acquired in Acres	Estimated Acquisition Cost
Route 1 Option C1	1	0.16483	$80,000
Route 1 Option C2	1	0.32905	$110,000
Route 1 Option C3A	10	1.26104	$1,100,000
Route 1 Option D1	9	0.91062	$1,390,000
Route 1 Option D2	8	0.87554	$1,340,000
Route 1 Option D3	4	0.64481	$770,000
Route 1 Option D4	5	0.38819	$860,000
Route 1 Option D5	4	0.28714	$780,000
Route 209 Spur	6	10.96330	$570,000
Rail Option 1	19	13.34295	$7,040,000
Rail Option 3	none	negligible	negligible
Rail Option 5	19	12.99070	$7,030,000
Rail Option 7	5	0.91107	$1,850,000



Building(s) to be displaced

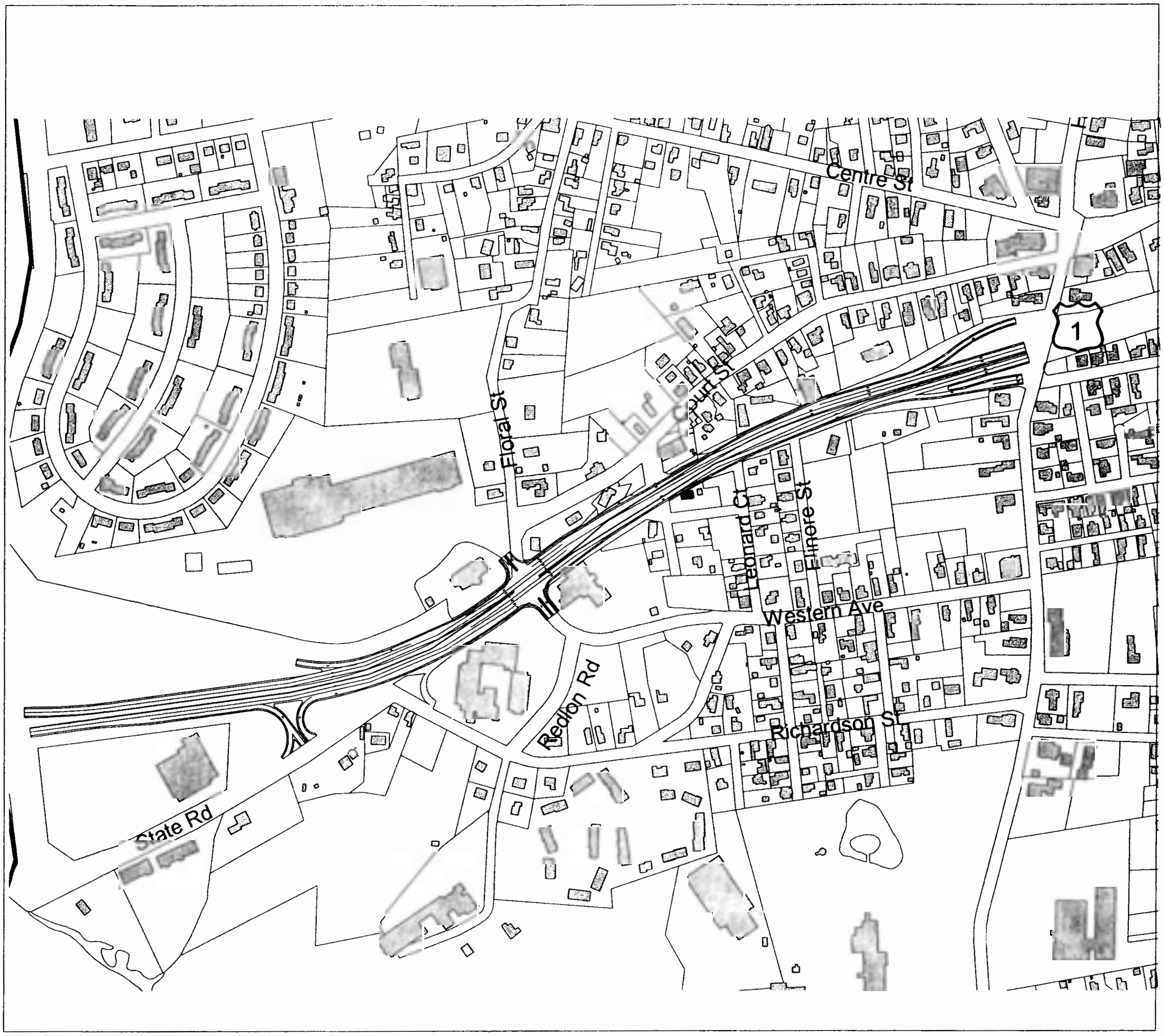
Property Lines

Option

Bath Feasibility Study
Option C1
Right of Way and Property Inventory and Impacts

Maine DOT PIN 10123.00

Not to Scale



Building(s) to be displaced

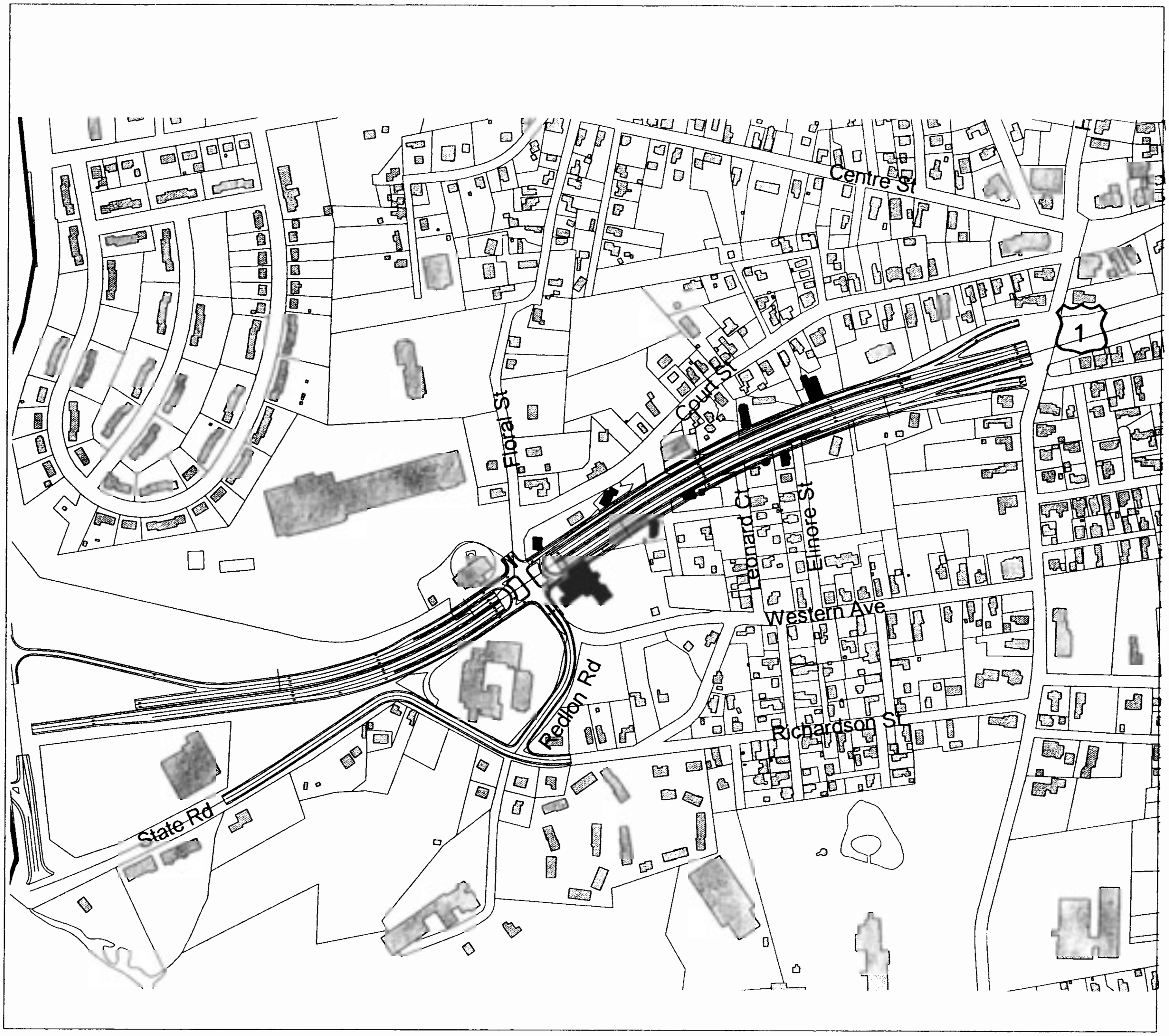
Property Lines

Option

Bath Feasibility Study
Option C2
Right of Way and Property Inventory and Impacts

Maine DOT PIN 10123.00

Not to Scale



Building(s) to be displaced

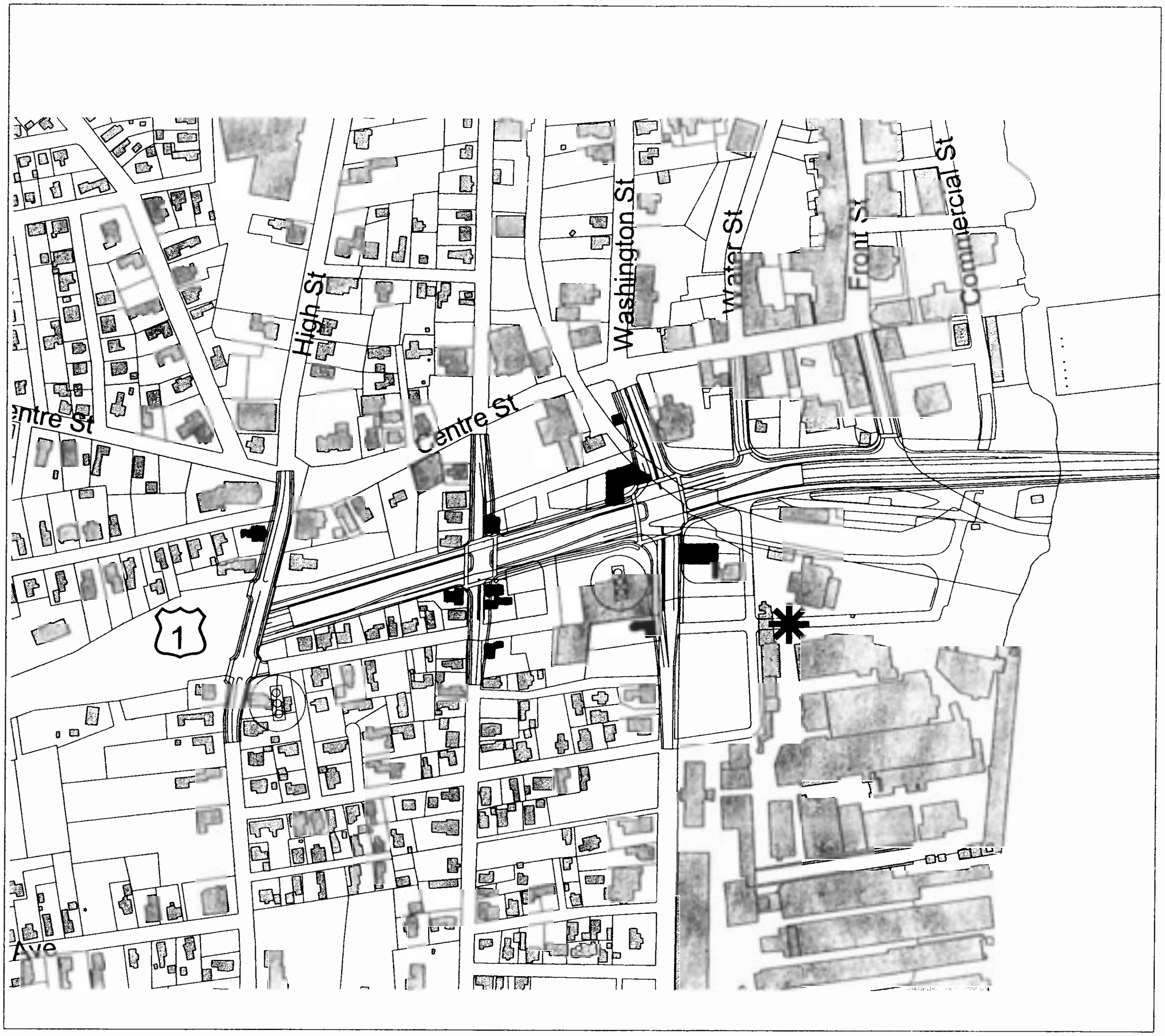
Property Lines

Option

Bath Feasibility Study
Option C3A
Right of Way and Property Inventory and Impacts

Maine DOT PIN 10123.00

Not to Scale



Building(s) to be displaced

Property Lines

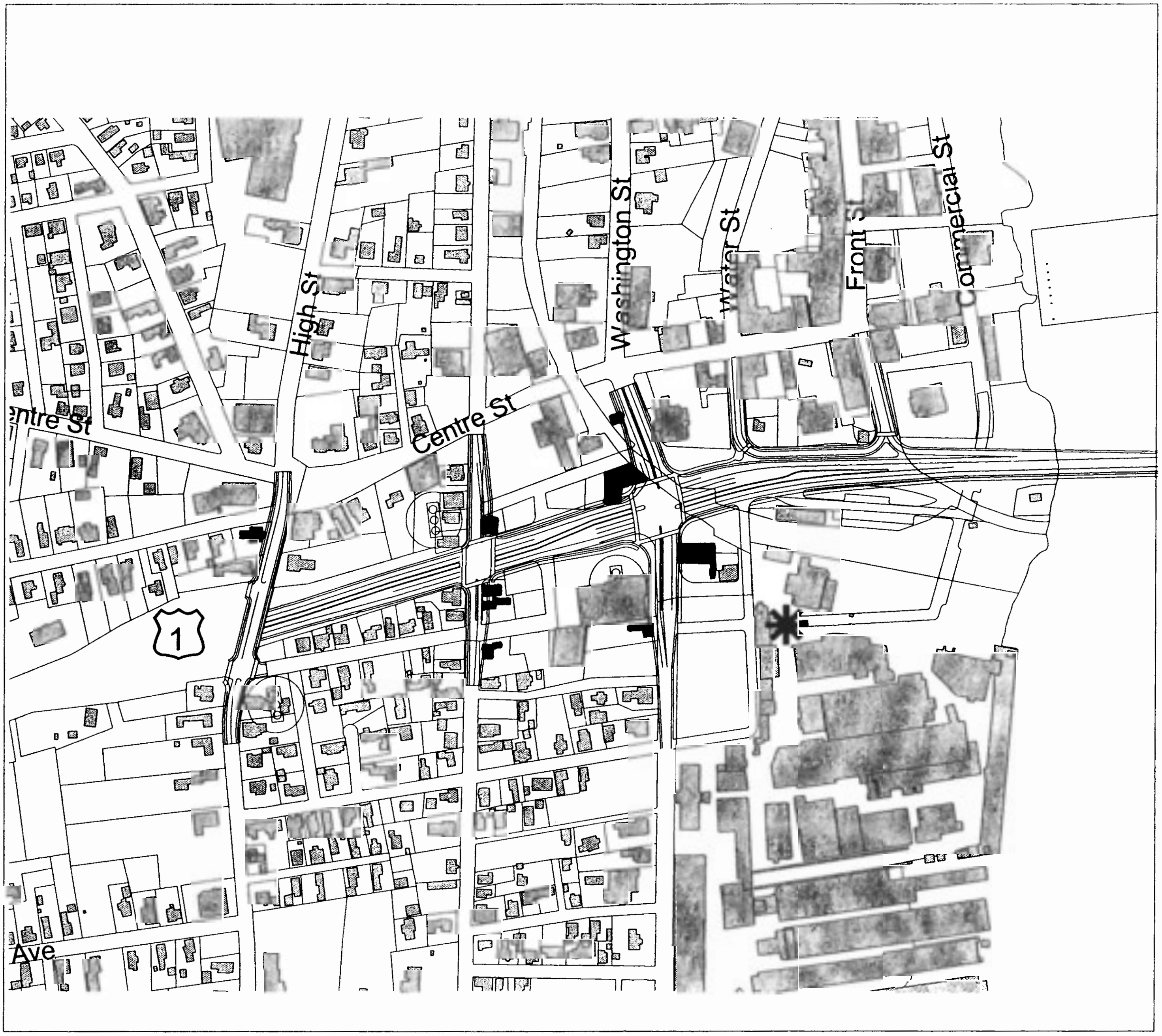
Option

* Building not included in impact calculation pending further study of proposed new local street network

Bath Feasibility Study
Option D1
Right of Way and Property Inventory and Impacts

Maine DOT PIN 10123.00

Not to Scale



Building(s) to be displaced

Property Lines

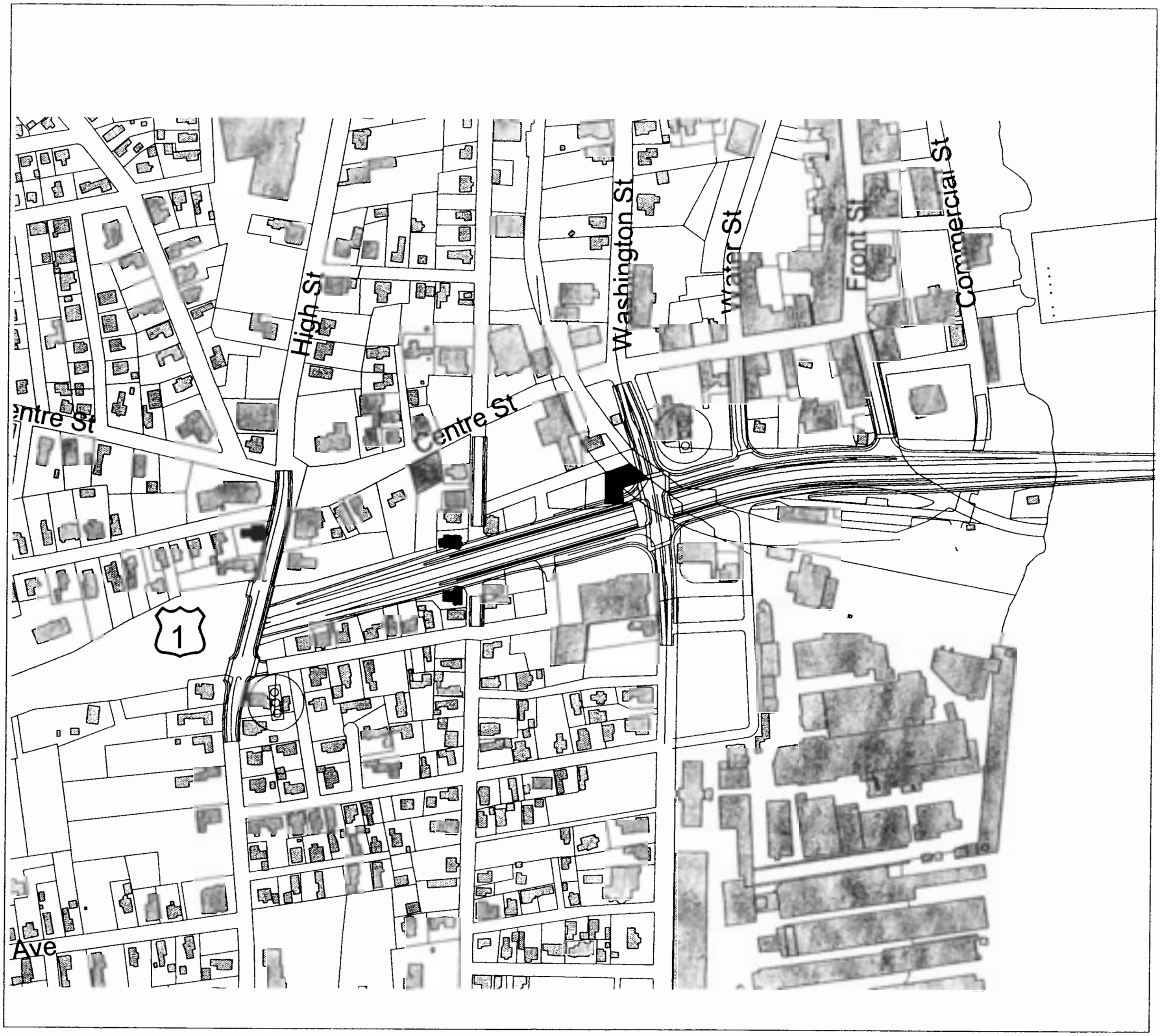
Option

✱ Building not included in impact calculation pending further study of proposed new local street network

Bath Feasibility Study
Option D2
Right of Way and Property Inventory and Impacts

Maine DOT PIN 10123.00

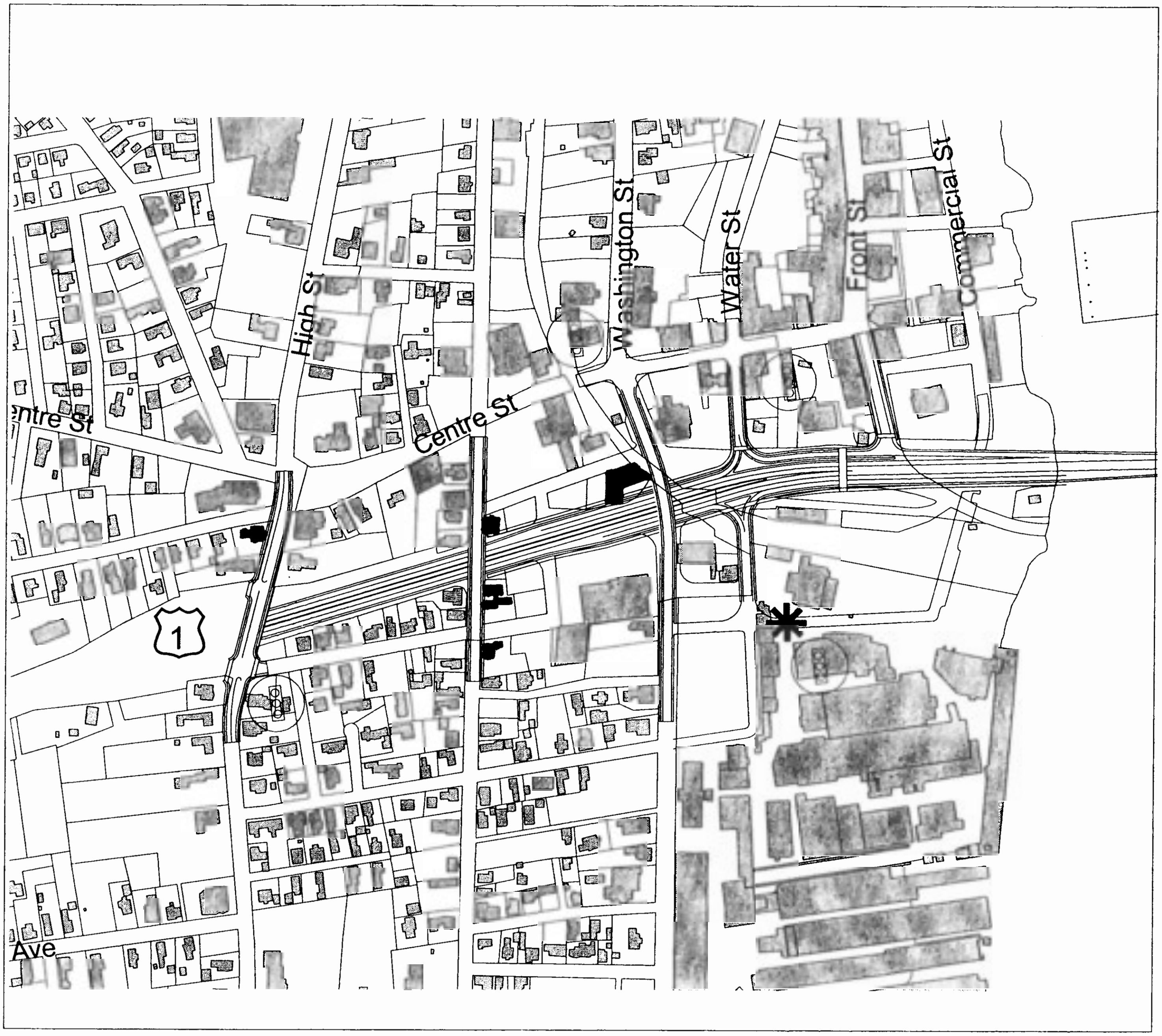
Not to Scale



Bath Feasibility Study
Option D3
Right of Way and Property Inventory and Impacts

Maine DOT PIN 10123.00

Not to Scale



Building(s) to be displaced

Property Lines

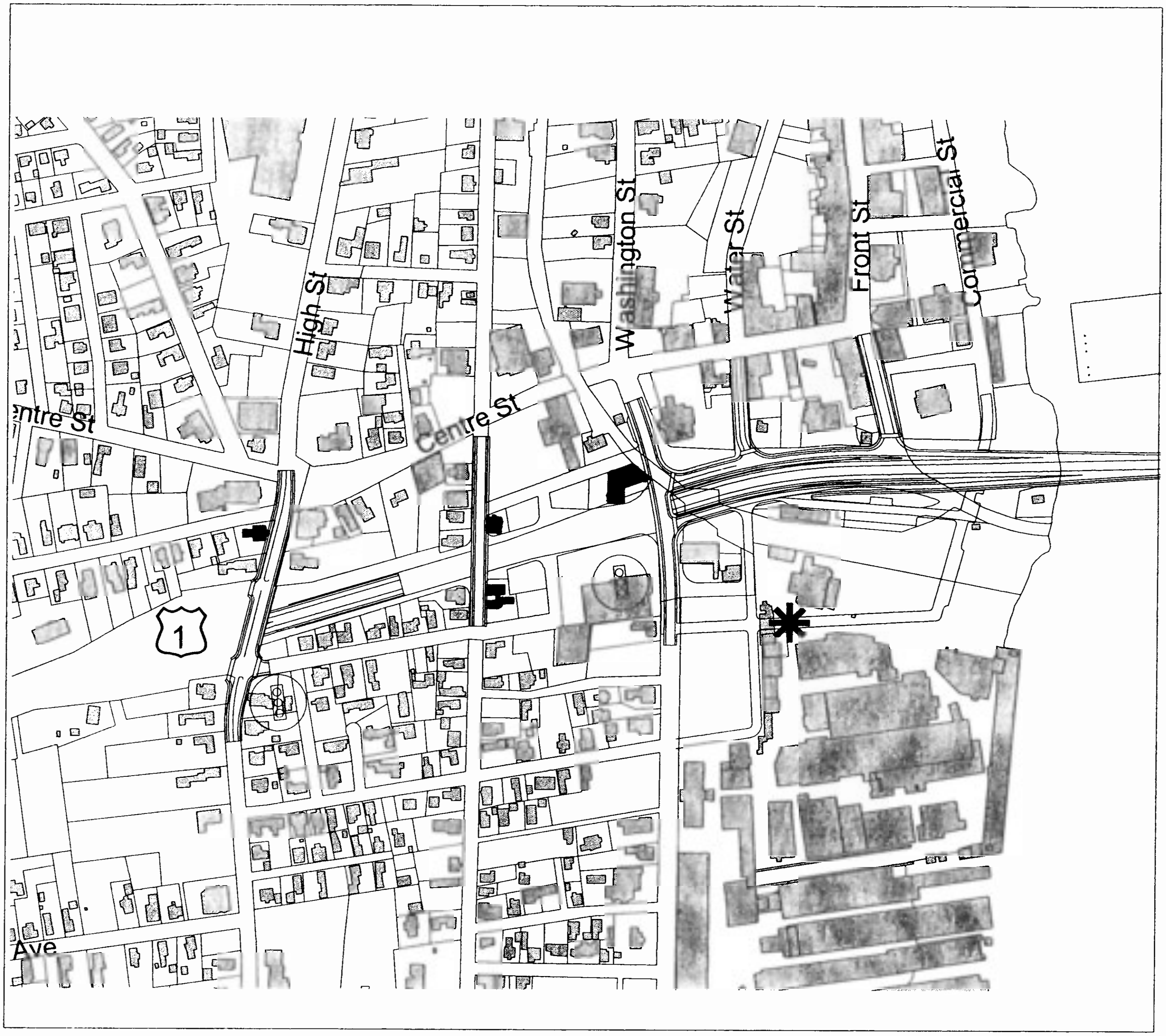
Option

* Building not included in impact calculation pending further study of proposed new local street network

Bath Feasibility Study
Option D4
Right of Way and Property Inventory and Impacts

Maine DOT PIN 10123.00

Not to Scale



Building(s) to be displaced

Property Lines

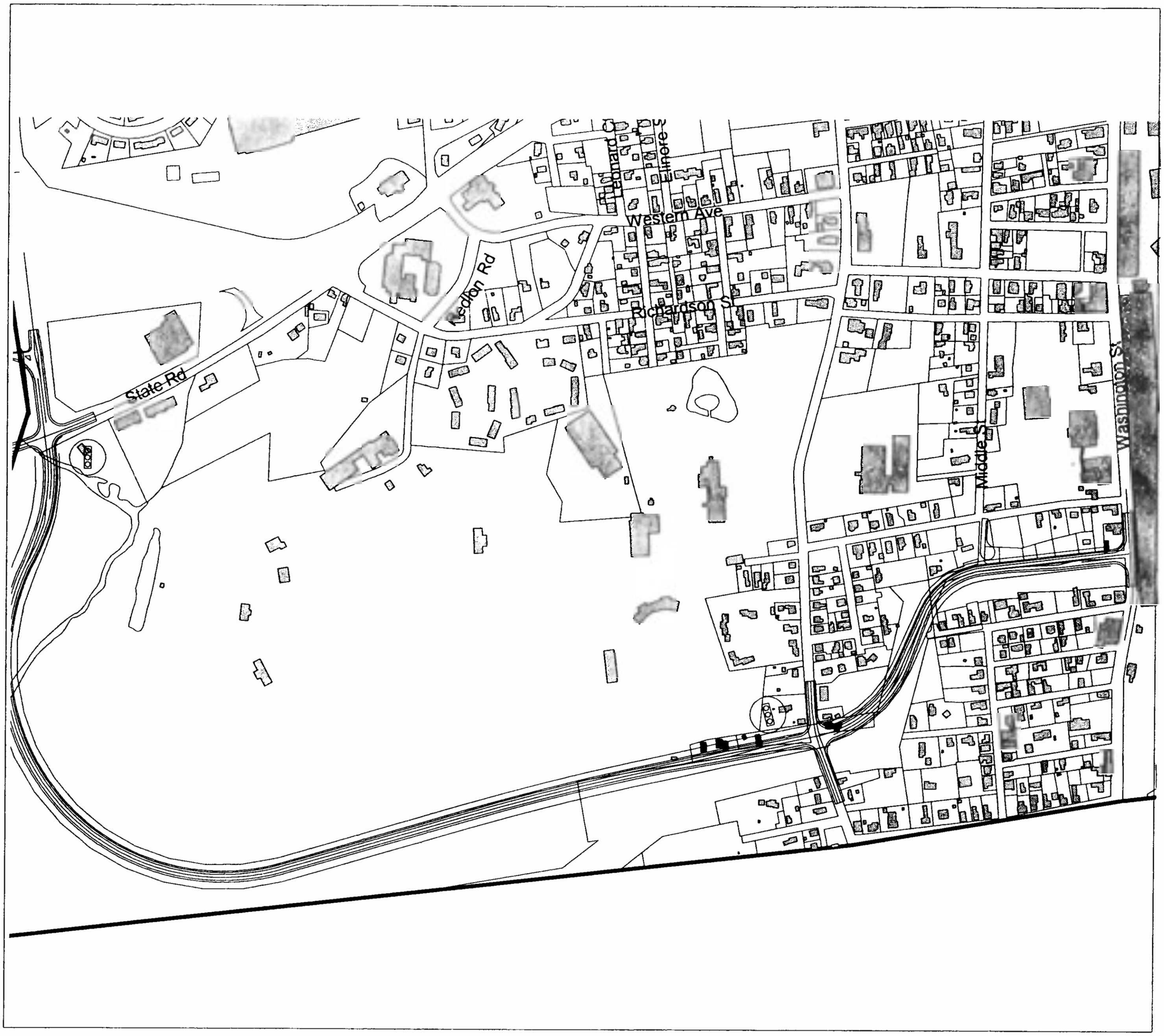
Option

✱ Building not included in impact calculation pending further study of proposed new local street network

Bath Feasibility Study
Option D5
Right of Way and Property Inventory and Impacts

Maine DOT PIN 10123.00

Not to Scale



Building(s) to be displaced

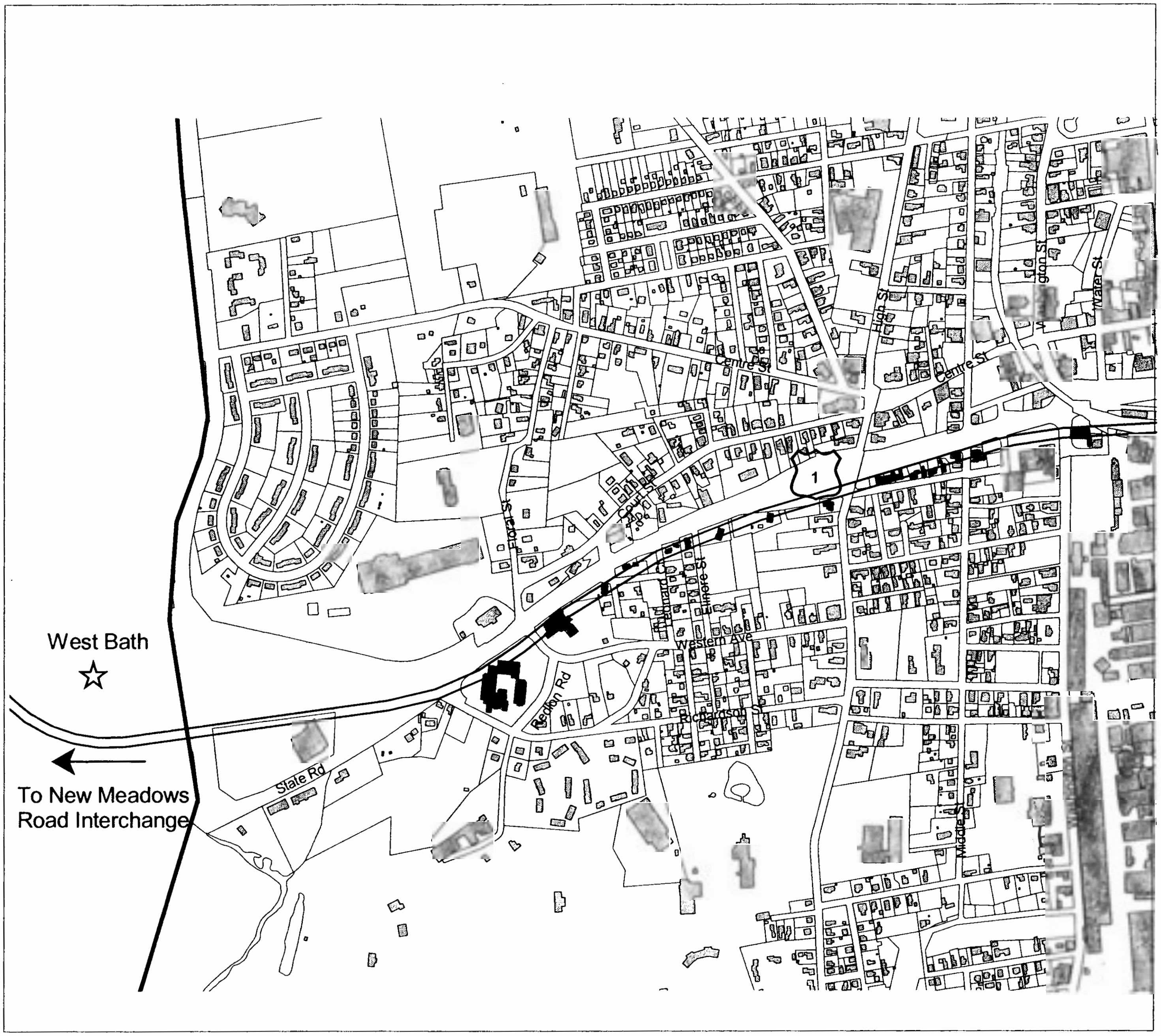
Property Lines

Option

Bath Feasibility Study
Route 209 Spur
Right of Way and Property Inventory and Impacts

Maine DOT PIN 10123.00

Not to Scale



Building(s) to be displaced

Property Lines

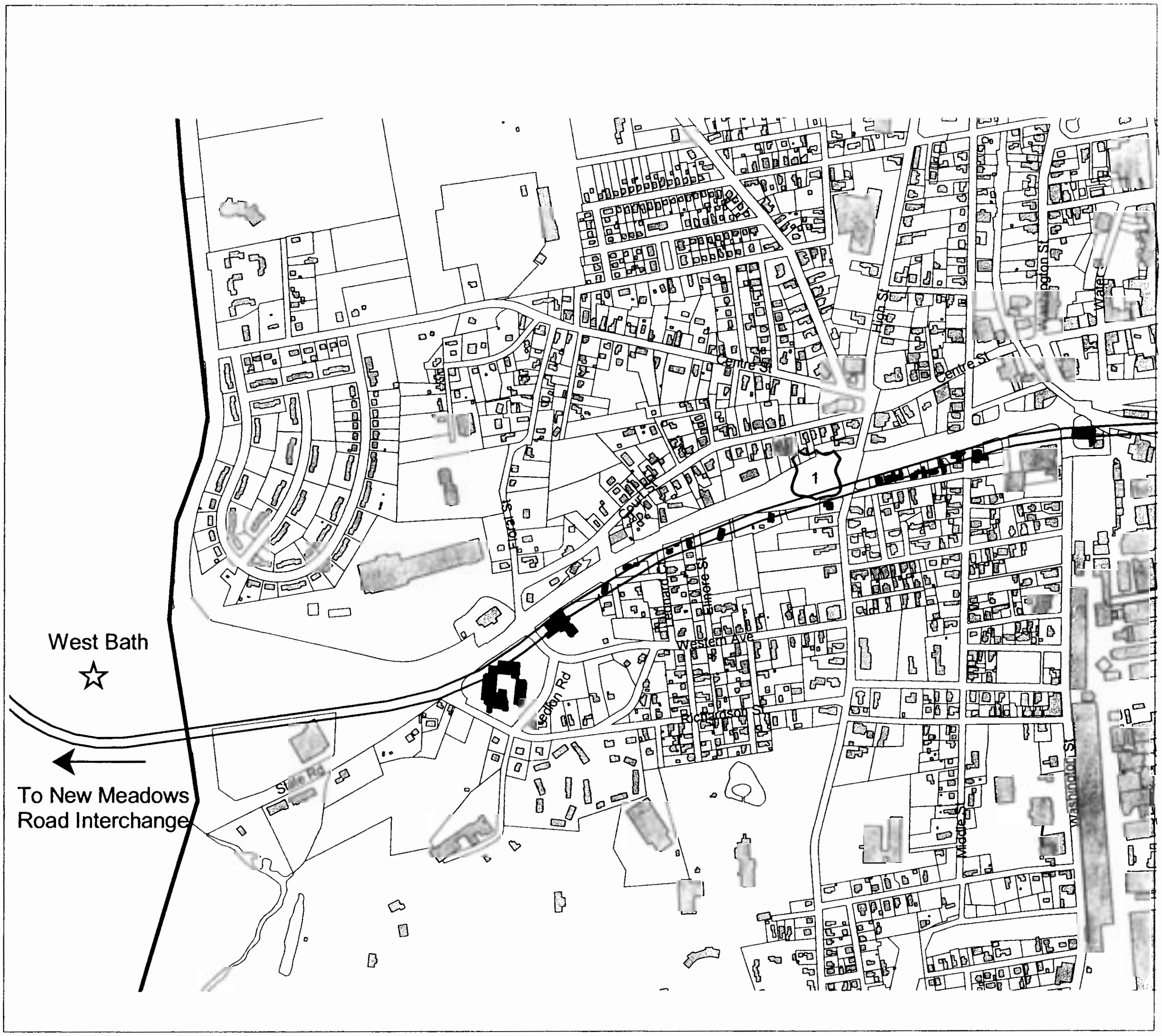
Option

No Displacements anticipated for West Bath

Bath Feasibility Study
Rail Option #1
Right of Way and Property Inventory and Impacts

Maine DOT PIN 10123.00

Not to Scale



Building(s) to be displaced

Property Lines

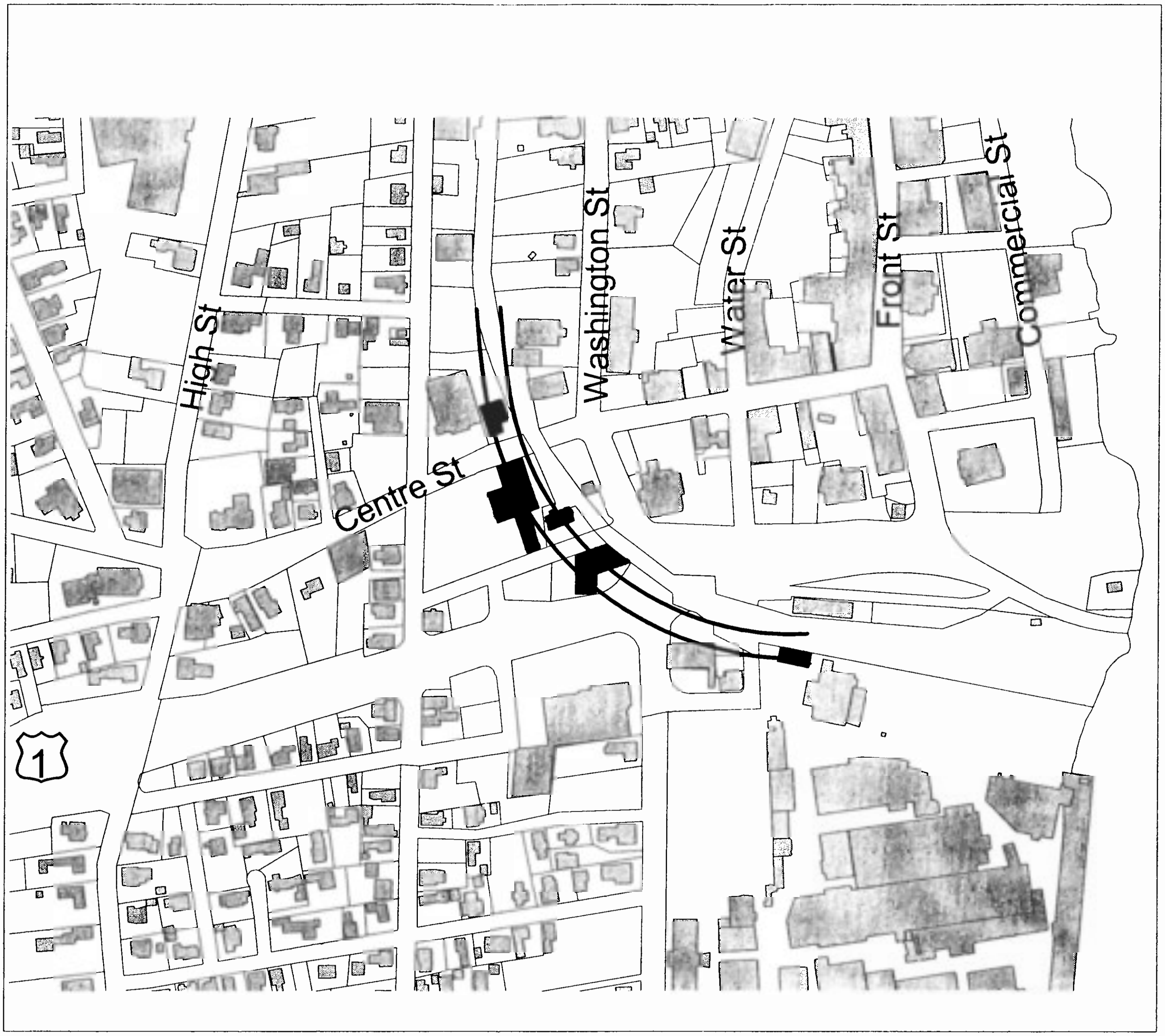
Option

☆ No Displacements anticipated for West Bath

Bath Feasibility Study
Rail Option #5
Right of Way and Property Inventory and Impacts

Maine DOT PIN 10123.00

Not to Scale



Building(s) to be displaced

Property Lines

Option

Bath Feasibility Study
Rail Option #7
Right of Way and Property Inventory and Impacts

Maine DOT PIN 10123.00

Not to Scale

Maine Department of Transportation
Bath Feasibility Study

MAPLOT	OWNER_NAME	STATE_	PROPERTY_L	SORT_PROPE	AC.	ZONING	ASSESSED CURRENT LAND VALUE	ASSESSED CURRENT BUILDING VALUE	ASSESSED CURRENT TOTAL	DISPLACE	DIRECT IMPACT (S.F.)	DIRECT IMPACT (AC.)	ASSESSED LAND VALUE OF IMPACT AREA	ASSESSED BUILDING VALUE OF IMPACT AREA	TOTAL ESTIMATED ACQUISITION COST
28-007-000	BUCK, BARBARA A	101	712 HIGH ST	HIGH ST 712	0.196343	R1	$18,400	$84,600	$103,000		38.93	0.000894	$84		$84
28-078-000	SEWALL, M W & CO	109	102 COURT ST	COURT ST 102	0.391133	C4	$21,100	$39,900	$61,000		622.86	0.014299	$771		$771
28-052-000	BATH ROUTE 1 LLC	323	1 CHANDLER DR	CHANDLER DR 1	15.067800	C4	$2,266,500	$3,082,000	$5,348,500		755.02	0.017333	$2,607		$2,607
28-055-000	ELWELL, ALAN R & MARY ANN	402	125 LEEMAN HWY	LEEMAN HWY 125	0.303066	C4	$118,500	$66,200	$184,700		468.58	0.010757	$4,206		$4,206
28-042-000	FROHMILLER, CHARLES D & T	130	1 QUIMBY ST	QUIMBY ST 1	0.169905	C4	$17,400	$0	$17,400		46.69	0.001072	$110		$110
28-043-000	FROHMILLER, CHARLES D & T	109	3 QUIMBY ST	QUIMBY ST 3	0.262147	C4	$20,200	$44,200	$64,400	YES	514.98	0.011822	$911	$44,200	$45,111
28-053-000	LATIUM MANAGEMENT CORP	334	141 LEEMAN HWY	LEEMAN HWY 141	0.499420	C4	$159,400	$173,700	$333,100		403.91	0.009272	$2,960		$2,960
28-050-000	MCDONALD'S CORP, THE	326	2 CHANDLER DR	CHANDLER DR 2	1.115830	C4	$160,500	$794,600	$955,100		1387.40	0.031850	$4,581		$4,581
28-049-000	DODGE, WILLIAM S	330	150 LEEMAN HWY	LEEMAN HWY 150	1.973210	C4	$300,000	$175,300	$475,300		979.58	0.022488	$3,419		$3,419
31-068-000	WALSH, THOMAS T INC	301	139 RICHARDSON S	RICHARDSON ST	2.881360	C4	$435,000	$4,999,500	$5,434,500		1962.21	0.045046	$6,801		$6,801
											7180.16	**0.1648338**	**$26,450**	**$44,200**	**$70,650**
															$80,000

Maine Department of Transportation
Bath Feasibility Study

MAPLOT	OWNER_NAME	STAT	PROPERTY_L	SORT_PROPE	AC.	ZONING	ASSESSED CURRENT LAND VALUE	ASSESSED CURRENT BUILDING VALUE	ASSESSED CURRENT TOTAL	DISPLACE	DIRECT IMPACT (S.F.)	DIRECT IMPACT (AC.)	ASSESSED LAND VALUE OF IMPACT AREA	ASSESSED BUILDING VALUE OF IMPACT AREA	TOTAL ESTIMATED ACQUISITION COST
28-058-000	PELLEGRINI, FERNANDO M & R	340	101 LEEMAN HWY	LEEMAN HWY 101	0.365361	C4	$121,200	$113,700	$234,900		249.07	0.005718	$1,897		$1,897
28-078-000	SEWALL, M W & CO	109	102 COURT ST	COURT ST 102	0.391133	C4	$21,100	$39,900	$61,000		1687.08	0.038730	$2,089		$2,089
28-056-000	SEWALL, M W & CO	335	115 LEEMAN HWY	LEEMAN HWY 115	0.348465	C4	$150,900	$175,300	$326,200		494.11	0.011343	$4,912		$4,912
28-055-000	ELWELL, ALAN R & MARY ANN	402	125 LEEMAN HWY	LEEMAN HWY 125	0.303066	C4	$118,500	$66,200	$184,700		1412.58	0.032428	$12,680		$12,680
28-054-001	SEWALL, MARK	390	LEEMAN HWY	LEEMAN HWY	0.104216	C4	$3,400	$0	$3,400		219.59	0.005041	$164		$164
28-042-000	FROHMILLER, CHARLES D & TH	130	1 QUIMBY ST	QUIMBY ST 1	0.169905	C4	$17,400	$0	$17,400		46.69	0.001072	$110		$110
28-043-000	FROHMILLER, CHARLES D & TH	109	3 QUIMBY ST	QUIMBY ST 3	0.262147	C4	$20,200	$44,200	$64,400	YES	514.98	0.011822	$911	$44,200	$45,111
28-054-000	LATIUM MANAGEMENT CORP	335	135 LEEMAN HWY	LEEMAN HWY 135	0.149746	C4	$83,800	$27,900	$111,700		253.87	0.005828	$3,261		$3,261
28-053-000	LATIUM MANAGEMENT CORP	334	141 LEEMAN HWY	LEEMAN HWY 141	0.499420	C4	$159,400	$173,700	$333,100		1946.00	0.044674	$14,259		$14,259
28-050-000	MCDONALD'S CORP, THE	326	2 CHANDLER DR	CHANDLER DR 2	1.115830	C4	$160,500	$794,600	$955,100		3810.58	0.087479	$12,583		$12,583
28-049-000	DODGE, WILLIAM S	330	150 LEEMAN HWY	LEEMAN HWY 150	1.973210	C4	$300,000	$175,300	$475,300		981.65	0.022536	$3,426		$3,426
31-068-000	WALSH, THOMAS T INC	301	139 RICHARDSON ST	RICHARDSON ST 139	2.881360	C4	$435,000	$4,999,500	$5,434,500		1962.21	0.045046	$6,801		$6,801
28-052-000	BATH ROUTE 1 LLC		1 CHANDLER DR	C/O EASTERN DEVELO	15.060000	C4	$2,266,500	$3,082,000	$5,348,500		755.02	0.017333	$2,609		$2,609
											14333.43	**0.329050**	**$65,701**	**$44,200**	**$109,901**
															$110,000

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Option C2

Maine Department of Transportation
Bath Feasibilty Study

MAPLOT	OWNER_NAME	STATE	PROPERTY_L	SORT_PROPE	AC.	ZONING	ASSESSED CURRENT LAND VALUE	ASSESSED CURRENT BUILDING VALUE	ASSESSED CURRENT TOTAL	DISPLACE	DIRECT IMPACT (S.F.)	DIRECT IMPACT (AC.)	ASSESSED LAND VALUE OF IMPACT AREA	ASSESSED BUILDING VALUE OF IMPACT AREA	TOTAL ESTIMATED ACQUISITION COST
28-059-000	NOR-PAR	326	75 LEEMAN HWY	LEEMAN HWY 75	0.81318	C4	$143,300	$410,600	$553,900		490.56	0.011262	$1,985		$1,985
28-058-000	PELLEGRINI, FERNANDO M	340	101 LEEMAN HWY	LEEMAN HWY 101	0.36536	C4	$121,200	$113,700	$234,900	YES	1370.29	0.031458	$10,435	$113,700	$124,135
28-057-000	SEWALL, M W & CO	390	COURT ST	COURT ST	0.18301	C4	$20,300	$0	$20,300		103.82	0.002383	$264		$264
28-078-000	SEWALL, M W & CO	109	102 COURT ST	COURT ST 102	0.39113	C4	$21,100	$39,900	$61,000		3655.08	0.083909	$4,527		$4,527
28-056-000	SEWALL, M W & CO	335	115 LEEMAN HWY	LEEMAN HWY 115	0.34847	C4	$150,900	$175,300	$326,200	YES	3504.69	0.080457	$34,841	$175,300	$210,141
28-010-000	BERT'S OIL SERVICE	334	82 LEEMAN HWY	LEEMAN HWY 82	0.52472	C4	$161,100	$91,300	$252,400		2058.51	0.047257	$14,509		$14,509
28-052-000	BATH ROUTE 1 LLC	323	1 CHANDLER DR	CHANDLER DR 1	15.06780	C4	$2,266,500	$3,082,000	$5,348,500		755.02	0.017333	$2,607		$2,607
28-012-000	CUMBERLAND FARMS INC	325	100 LEEMAN HWY	LEEMAN HWY 100	0.35411	C4	$150,900	$76,800	$227,700		2840.59	0.065211	$27,789		$27,789
28-055-000	ELWELL, ALAN R & MARY A	402	125 LEEMAN HWY	LEEMAN HWY 125	0.30307	C4	$118,500	$66,200	$184,700		3045.44	0.069914	$27,337		$27,337
28-031-000	PYE, JUDITH LAKIN	101	12 COTTAGE ST	COTTAGE ST 12	0.10781	C4	$15,500	$22,000	$37,500	YES	1324.31	0.030402	$4,371	$22,000	$26,371
28-032-000	ANDERSON, JULIE-ELLEN	101	11 ELSINORE AVE	ELSINORE AVE 11	0.21104	C4	$18,700	$29,500	$48,200	YES	2028.49	0.046568	$4,126	$10,000	$14,126
28-054-001	SEWALL, MARK	390	LEEMAN HWY	LEEMAN HWY	0.10422	C4	$3,400	$0	$3,400		219.59	0.005041	$164		$164
28-042-000	FROHMILLER, CHARLES D &	130	1 QUIMBY ST	QUIMBY ST 1	0.16991	C4	$17,400	$0	$17,400		2298.67	0.052770	$5,404		$5,404
28-043-000	FROHMILLER, CHARLES D &	109	3 QUIMBY ST	QUIMBY ST 3	0.26215	C4	$20,200	$44,200	$64,400	YES(2 BLDGS)	4047.06	0.092908	$7,159	$44,200	$51,359
28-054-000	LATIUM MANAGEMENT COR	335	135 LEEMAN HWY	LEEMAN HWY 135	0.14975	C4	$83,800	$27,900	$111,700	YES	1607.93	0.036913	$20,657	$27,900	$48,557
28-053-000	LATIUM MANAGEMENT COR	334	141 LEEMAN HWY	LEEMAN HWY 141	0.49942	C4	$159,400	$173,700	$333,100	YES	3631.67	0.083372	$26,610	$173,700	$200,310
28-048-000	C N BROWN CO	334	132 LEEMAN HWY	LEEMAN HWY 132	0.23028	C4	$144,200	$59,200	$203,400	YES	3028.27	0.069520	$43,533	$59,200	$102,733
28-050-000	MCDONALD'S CORP, THE	326	2 CHANDLER DR	CHANDLER DR 2	1.11583	C4	$160,500	$794,600	$955,100		10817.32	0.248331	$35,720		$35,720
28-049-000	DODGE, WILLIAM S	330	150 LEEMAN HWY	LEEMAN HWY 150	1.97321	C4	$300,000	$175,300	$475,300	YES	5066.81	0.116318	$17,685	$175,300	$192,985
31-068-000	WALSH, THOMAS T INC	301	139 RICHARDSON ST	RICHARDSON ST 1	2.88136	C4	$435,000	$4,999,500	$5,434,500		1941.23	0.044565	$6,728		$6,728
31-070-000	RUMERY, JUDITH	101	87 RICHARDSON ST	RICHARDSON ST 8	0.33046	R1	$21,300	$53,100	$74,400		1095.52	0.025150	$1,621		$1,621
											54930.87	**1.261039**	**$298,072**	**$801,300**	**$1,099,372**
															$1,100,000

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Maine Department of Transportation
Bath Feasibility Study

MAPLOT	OWNER_NAME	STATE	PROPERTY_L	SORT_PROPE	AC.	ZONING	ASSESSED CURRENT LAND VALUE	ASSESSED CURRENT BUILDING VALUE	ASSESSED CURRENT TOTAL	DISPLACE	DIRECT IMPACT (S.F.)	DIRECT IMPACT (AC.)	ASSESSED LAND VALUE OF IMPACT AREA	ASSESSED BUILDING VALUE OF IMPACT AREA	TOTAL ESTIMATED ACQUISITION COST
27-084-000	B I W EMPLOYEES FEDERAL CRE	341	765 WASHINGTON ST	WASHINGTON ST 76	0.822524	C1	$145,400	$1,386,100	$1,531,500		4.30	0.000099	$17		$17
27-083-000	FIVE COUNTY CREDIT UNION	390	775 WASHINGTON ST	WASHINGTON ST 77	0.071164	C1	$21,400	$0	$21,400		117.89	0.002706	$814		$814
27-075-000	WEBBER ENERGY GASOLINE	325	770 WASHINGTON ST	WASHINGTON ST 77	0.153228	C1	$44,100	$68,400	$112,500	YES	1297.72	0.029792	$8,574	$68,400	$76,974
27-068-000	BATH IRON WORKS CORP	400	108 CENTRE ST	CENTRE ST 108	1.207490	C1	$209,100	$577,400	$786,500		2732.72	0.062735	$10,864		$10,864
27-074-000	STATE OF ME	901	WASHINGTON ST	WASHINGTON ST	0.033487	C1	$19,400	$0	$19,400		730.68	0.016774	$9,718		$9,718
27-072-000	BLAKE, HALCYON	402	12 SCHOOL ST	SCHOOL ST 12	0.304910	C1	$31,200	$461,800	$493,000	YES	4268.97	0.098002	$10,028	$461,800	$471,828
28-115-000	SAGADAHOC COUNTY COURT H	902	752 HIGH ST	HIGH ST 752	0.588984	C1	$38,200	$1,978,700	$2,016,900		88.10	0.002022	$131		$131
27-071-000	BATH IRON WORKS CORP	400	SCHOOL ST	SCHOOL ST	0.140060	C1	$24,400	$0	$24,400		188.41	0.004325	$754		$754
27-070-000	WIGHT, CARLTON E & EVA S	390	5 LEEMAN HWY	LEEMAN HWY 5	0.126514	C1	$24,200	$0	$24,200		689.99	0.015840	$3,030		$3,030
27-138-000	CITY OF BATH	903	15 COMMERCIAL ST	COMMERCIAL ST 15	0.201794	C1	$28,100	$88,600	$116,700		522.43	0.011993	$1,670		$1,670
27-017-000	VAN REENEN, KRISTIN MARGUEF	326	160 CENTRE ST	CENTRE ST 160	0.152600	C1	$15,600	$136,100	$151,700		310.77	0.007134	$729		$729
27-136-000	BATH IRON WORKS CORP	400	COMMERCIAL ST	COMMERCIAL ST	0.208785	C1	$20,600	$0	$20,600		4844.74	0.111220	$10,974		$10,974
27-002-000	GUIDI, JAMES P	340	746 HIGH ST	HIGH ST 746	0.172991	C2	$26,600	$135,200	$161,800	YES	1045.00	0.023990	$3,689	$135,200	$138,889
27-029-000	CAREY, ANTONIO W & JULIE A	105	746 MIDDLE ST	MIDDLE ST 746	0.094182	C1	$14,900	$61,900	$76,800		40.15	0.000922	$146		$146
27-018-000	PARKER, JEFFREY P & ELLEN M	101	739 HIGH ST	HIGH ST 739	0.604123	C1	$25,600	$105,600	$131,200		280.27	0.006434	$273		$273
27-174-000	UNITED STATES POSTAL SERVIC	900	750 WASHINGTON ST	WASHINGTON ST 75	1.464950	C1	$60,000	$2,185,000	$2,245,000		10404.20	0.238848	$9,782		$9,782
27-140-000	PAPADOPOULOS, NICK & BISSIAS	326	737 WASHINGTON ST	WASHINGTON ST 73	0.156555	C1	$25,700	$230,600	$256,300	YES	251.60	0.005776	$948	$230,600	$231,548
27-001-000	BOUDREAU, EDWARD H & MARG	105	738 HIGH ST	HIGH ST 738	0.291936	C2	$20,500	$87,400	$107,900		855.62	0.019642	$1,379		$1,379
27-175-000	KING, WILLIAM F JR & SUSAN D	337	10 FRANKLIN ST	FRANKLIN ST 10	0.160494	C1	$23,000	$0	$23,000		1860.38	0.042708	$6,120		$6,120
27-141-000	BATH IRON WORKS CORP	400	4 KING ST	KING ST 4	0.156393	C1	$27,900	$0	$27,900		125.04	0.002871	$512		$512
27-176-000	KING, WILLIAM F JR	325	735 MIDDLE ST	MIDDLE ST 735	0.193451	C1	$27,600	$71,100	$98,700	YES	2339.53	0.053708	$7,663	$71,100	$78,763
27-028-000	FOX, MONTE J & DEBRA ANN	104	734 MIDDLE ST	MIDDLE ST 734	0.119961	R1	$15,800	$44,500	$60,300	YES	283.71	0.006513	$858	$44,500	$45,358
27-025-000	TATTERSALL, ROBERT B & RUTH	101	39 GRANITE ST	GRANITE ST 39	0.122498	R1	$15,800	$37,600	$53,400		37.37	0.000858	$111		$111
27-023-000	AMBROSE, LESLIE L	101	47 GRANITE ST	GRANITE ST 47	0.117500	R1	$15,800	$45,600	$61,400		17.25	0.000396	$53		$53
27-173-000	AFL-CIO LOCAL #6 TRUSTEES	353	722 WASHINGTON ST	WASHINGTON ST 72	0.274215	C2	$30,700	$121,600	$152,300	YES	1057.30	0.024272	$2,717	$121,600	$124,317
27-180-000	NEAL, NAN-ELIZABETH	121	723 MIDDLE ST	MIDDLE ST 723	0.230648	R1	$19,400	$64,500	$83,900	YES	283.71	0.006513	$548	$64,500	$65,048
27-172-000	WIGHT, CARLTON E	337	716 WASHINGTON ST	WASHINGTON ST 71	0.352794	C2	$54,500	$10,900	$65,400		575.65	0.013215	$2,041		$2,041
27-181-000	THOMPSON, FRED W & BETTY S	101	717 MIDDLE ST	MIDDLE ST 717	0.057904	R1	$13,900	$55,200	$69,100		68.71	0.001577	$379		$379
27-212-000	HARRINGTON, BARBARA A	031	709 HIGH ST	HIGH ST 709	0.197148	R1	$18,400	$108,500	$126,900		182.47	0.004189	$391		$391
28-007-000	BUCK, BARBARA A	101	712 HIGH ST	HIGH ST 712	0.196343	R1	$18,400	$84,600	$103,000		949.44	0.021796	$2,043		$2,043
27-167-000	708 WASHINGTON ST, LLC	111	708 WASHINGTON ST	WASHINGTON ST 70	0.144875	C2	$25,200	$110,400	$135,600		45.58	0.001046	$182		$182
28-006-000	TORREY, WILLIAM A III	101	704 HIGH ST	HIGH ST 704	0.238630	R1	$19,700	$110,800	$130,500		124.18	0.002851	$235		$235
27-214-000	JACKSON, WILLIAM N	101	695 HIGH ST	HIGH ST 695	0.151461	R1	$16,800	$84,100	$100,900		202.22	0.004642	$515		$515
27-069-000	WIGHT, CARLTON E & EVA S	325	36 SCHOOL ST	SCHOOL ST 36	0.077266	C1	$21,800	$73,600	$95,400	YES	1916.42	0.043995	$12,413	$73,600	$86,013
27-139-000	BATH IRON WORKS CORP	400	743 WASHINGTON ST	WASHINGTON ST 74	0.167249	C1	$29,600	$0	$29,600		774.73	0.017785	$3,148		$3,148
27-141-000	BATH IRON WORKS CORP	400	4 KING ST	KING ST 4	0.156393	C1	$27,900	$0	$27,900		125.04	0.002871	$512		$512
27-024-000	MOORE PROPERTIES INC	104	43 GRANITE ST	GRANITE ST 43	0.075911	R1	$14,600	$30,500	$45,100		24.44	0.000561	$108		$108
											39666.73	**0.910623**	**$114,069**	**$1,271,300**	**$1,385,369**
															$1,390,000

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Option D1

Maine Department of Transportation
Bath Feasibility Study

MAPLOT	OWNER_NAME	STATI	PROPERTY_L	SORT_PROPE	AC.	ZONING	ASSESSED CURRENT LAND VALUE	ASSESSED CURRENT BUILDING VALUE	ASSESSED CURRENT TOTAL	DISPLACE	DIRECT IMPACT (S.F.)	DIRECT IMPACT (AC.)	ASSESSED LAND VALUE OF IMPACT AREA	ASSESSED BUILDING VALUE OF IMPACT AREA	TOTAL ESTIMATED ACQUISITION COST
27-075-000	WEBBER ENERGY GASOLINE	325	770 WASHINGTON S	WASHINGTON ST 770	0.153228	C1	$44,100	$68,400	$112,500	YES	1297.72	0.029792	$8,574	$68,400	$76,974
27-068-000	BATH IRON WORKS CORP	400	108 CENTRE ST	CENTRE ST 108	1.207490	C1	$209,100	$577,400	$786,500		2732.72	0.062735	$10,864		$10,864
27-101-000	O'DARE, JAMES P & LAROCHELLE, GE	326	45 VINE ST	VINE ST 45	0.148531	C1	$39,100	$45,200	$84,300		595.29	0.013666	$3,597		$3,597
27-074-000	STATE OF ME	901	WASHINGTON ST	WASHINGTON ST	0.033487	C1	$19,400	$0	$19,400		730.98	0.016781	$9,722		$9,722
27-072-000	BLAKE, HALCYON	402	12 SCHOOL ST	SCHOOL ST 12	0.304910	C1	$31,200	$461,800	$493,000	YES	4174.30	0.095829	$9,806	$461,800	$471,606
28-115-000	SAGADAHOC COUNTY COURT HOUSE	902	752 HIGH ST	HIGH ST 752	0.588984	C1	$38,200	$1,978,700	$2,016,900		88.10	0.002022	$131		$131
27-071-000	BATH IRON WORKS CORP	400	SCHOOL ST	SCHOOL ST	0.140060	C1	$24,400	$0	$24,400		156.84	0.003601	$627		$627
27-070-000	WIGHT, CARLTON E & EVA S	390	5 LEEMAN HWY	LEEMAN HWY 5	0.126514	C1	$24,200	$0	$24,200		226.08	0.005190	$993		$993
27-138-000	CITY OF BATH	903	15 COMMERCIAL ST	COMMERCIAL ST 15	0.201794	C1	$28,100	$88,600	$116,700		522.43	0.011993	$1,670		$1,670
27-069-000	WIGHT, CARLTON E & EVA S	325	36 SCHOOL ST	SCHOOL ST 36	0.077266	C1	$21,800	$73,600	$95,400	YES	1647.89	0.037830	$10,674	$73,600	$84,274
27-017-000	VAN REENEN, KRISTIN MARGUERITE	326	160 CENTRE ST	CENTRE ST 160	0.152600	C1	$15,600	$136,100	$151,700		310.77	0.007134	$729		$729
27-136-000	BATH IRON WORKS CORP	400	COMMERCIAL ST	COMMERCIAL ST	0.208785	C1	$20,600	$0	$20,600		4844.74	0.111220	$10,974		$10,974
27-139-000	BATH IRON WORKS CORP	400	743 WASHINGTON S	WASHINGTON ST 743	0.167249	C1	$29,600	$0	$29,600		740.04	0.016989	$3,007		$3,007
27-002-000	GUIDI, JAMES P	340	746 HIGH ST	HIGH ST 746	0.172991	C2	$26,600	$135,200	$161,800	YES	1045.00	0.023990	$3,689	$135,200	$138,889
27-018-000	PARKER, JEFFREY P & ELLEN M	101	739 HIGH ST	HIGH ST 739	0.604123	C1	$25,600	$105,600	$131,200		280.27	0.006434	$273		$273
27-174-000	UNITED STATES POSTAL SERVICE	900	750 WASHINGTON S	WASHINGTON ST 750	1.464950	C1	$60,000	$2,185,000	$2,245,000		10237.14	0.235012	$9,625		$9,625
27-001-000	BOUDREAU, EDWARD H & MARGARET	105	738 HIGH ST	HIGH ST 738	0.291936	C2	$20,500	$87,400	$107,900		855.62	0.019642	$1,379		$1,379
27-175-000	KING, WILLIAM F JR & SUSAN D	337	10 FRANKLIN ST	FRANKLIN ST 10	0.160494	C1	$23,000	$0	$23,000		1289.52	0.029603	$4,242		$4,242
27-176-000	KING, WILLIAM F JR	325	735 MIDDLE ST	MIDDLE ST 735	0.193451	C1	$27,600	$71,100	$98,700	YES	2299.34	0.052786	$7,531	$71,100	$78,631
27-173-000	AFL-CIO LOCAL #6 TRUSTEES	353	722 WASHINGTON S	WASHINGTON ST 722	0.274215	C2	$30,700	$121,600	$152,300	YES	1057.30	0.024272	$2,717	$121,600	$124,317
27-180-000	NEAL, NAN-ELIZABETH	121	723 MIDDLE ST	MIDDLE ST 723	0.230648	R1	$19,400	$64,500	$83,900	YES	1098.24	0.025212	$2,121	$64,500	$66,621
27-181-000	THOMPSON, FRED W & BETTY S	101	717 MIDDLE ST	MIDDLE ST 717	0.057904	R1	$13,900	$55,200	$69,100		68.71	0.001577	$379		$379
27-212-000	HARRINGTON, BARBARA A	031	709 HIGH ST	HIGH ST 709	0.197148	R1	$18,400	$108,500	$126,900		182.47	0.004189	$391		$391
28-007-000	BUCK, BARBARA A	101	712 HIGH ST	HIGH ST 712	0.196343	R1	$18,400	$84,600	$103,000		949.44	0.021796	$2,043		$2,043
28-006-000	TORREY, WILLIAM A III	101	704 HIGH ST	HIGH ST 704	0.238630	R1	$19,700	$110,800	$130,500		124.18	0.002851	$235		$235
27-214-000	JACKSON, WILLIAM N	101	695 HIGH ST	HIGH ST 695	0.151461	R1	$16,800	$84,100	$100,900		202.22	0.004642	$515		$515
27-141-000	BATH IRON WORKS CORP	400	4 KING ST	KING ST 4	0.156393	C1	$27,900	$0	$27,900		125.04	0.002871	$512		$512
27-140-000	PAPADOPOULOS, NICK & BISSIAS, PE	326	737 WASHINGTON S	WASHINGTON ST 737	0.156555	C1	$25,700	$230,600	$256,300	YES	256.00	0.005877	$965	$230,600	$231,565
											38138.39	**0.875537**	**$107,984**	**$1,226,800**	**$1,334,784**
															$1,340,000

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MAPLOT	OWNER_NAME	STATE	PROPERTY_L	SORT_PROPE	AC.	ZONING	ASSESSED CURRENT LAND VALUE	ASSESSED CURRENT BUILDING VALUE	ASSESSED CURRENT TOTAL	DISPLACE	DIRECT IMPACT (S.F.)	DIRECT IMPACT (AC.)	ASSESSED LAND VALUE OF IMPACT AREA	ASSESSED BUILDING VALUE OF IMPACT AREA	TOTAL ESTIMATED ACQUISITION COST
27-075-000	WEBBER ENERGY GASOLINE	325	770 WASHINGTON	WASHINGTON ST	0.153228	C1	$44,100	$68,400	$112,500		747.44	0.017159	$4,938		$4,938
27-072-000	BLAKE, HALCYON	402	12 SCHOOL ST	SCHOOL ST 12	0.304910	C1	$31,200	$461,800	$493,000	YES	4114.29	0.094451	$9,665	$461,800	$471,465
28-115-000	SAGADAHOC COUNTY COURT	902	752 HIGH ST	HIGH ST 752	0.588984	C1	$38,200	$1,978,700	$2,016,900		88.10	0.002022	$131		$131
27-071-000	BATH IRON WORKS CORP	400	SCHOOL ST	SCHOOL ST	0.140060	C1	$24,400	$0	$24,400		225.62	0.005180	$902		$902
27-138-000	CITY OF BATH	903	15 COMMERCIAL S	COMMERCIAL ST	0.201794	C1	$28,100	$88,600	$116,700		522.43	0.011993	$1,670		$1,670
27-136-000	BATH IRON WORKS CORP	400	COMMERCIAL ST	COMMERCIAL ST	0.208785	C1	$20,600	$0	$20,600		4844.74	0.111220	$10,974		$10,974
27-139-000	BATH IRON WORKS CORP	400	743 WASHINGTON	WASHINGTON ST	0.167249	C1	$29,600	$0	$29,600		401.95	0.009228	$1,633		$1,633
27-002-000	GUIDI, JAMES P	340	746 HIGH ST	HIGH ST 746	0.172991	C2	$26,600	$135,200	$161,800	YES	1045.00	0.023990	$3,689	$135,200	$138,889
27-029-000	CAREY, ANTONIO W & JULIE A	105	746 MIDDLE ST	MIDDLE ST 746	0.094182	C1	$14,900	$61,900	$76,800	YES	579.46	0.013303	$2,105	$61,900	$64,005
27-174-000	UNITED STATES POSTAL SER	900	750 WASHINGTON	WASHINGTON ST	1.464950	C1	$60,000	$2,185,000	$2,245,000		9185.11	0.210861	$8,636		$8,636
27-001-000	BOUDREAU, EDWARD H & MA	105	738 HIGH ST	HIGH ST 738	0.291936	C2	$20,500	$87,400	$107,900		855.62	0.019642	$1,379		$1,379
27-175-000	KING, WILLIAM F JR & SUSAN	337	10 FRANKLIN ST	FRANKLIN ST 10	0.160494	C1	$23,000	$0	$23,000		1725.03	0.039601	$5,675		$5,675
27-176-000	KING, WILLIAM F JR	325	735 MIDDLE ST	MIDDLE ST 735	0.193451	C1	$27,600	$71,100	$98,700		388.59	0.008921	$1,273		$1,273
27-028-000	FOX, MONTE J & DEBRA ANN	104	734 MIDDLE ST	MIDDLE ST 734	0.119961	R1	$15,800	$44,500	$60,300	YES	956.25	0.021952	$2,891	$44,500	$47,391
27-025-000	TATTERSALL, ROBERT B & RU	101	39 GRANITE ST	GRANITE ST 39	0.122498	R1	$15,800	$37,600	$53,400		171.01	0.003926	$506		$506
27-024-000	MOORE PROPERTIES INC	104	43 GRANITE ST	GRANITE ST 43	0.075911	R1	$14,600	$30,500	$45,100		47.70	0.001095	$211		$211
27-173-000	AFL-CIO LOCAL #6 TRUSTEES	353	722 WASHINGTON	WASHINGTON ST	0.274215	C2	$30,700	$121,600	$152,300		140.16	0.003218	$360		$360
27-212-000	HARRINGTON, BARBARA A	031	709 HIGH ST	HIGH ST 709	0.197148	R1	$18,400	$108,500	$126,900		182.47	0.004189	$391		$391
28-007-000	BUCK, BARBARA A	101	712 HIGH ST	HIGH ST 712	0.196343	R1	$18,400	$84,600	$103,000		949.44	0.021796	$2,043		$2,043
27-017-000	VAN REENEN, KRISTIN MARG	326	160 CENTRE ST	CENTRE ST 160	0.152600	C1	$15,600	$136,100	$151,700		310.77	0.007134	$729		$729
27-018-000	PARKER, JEFFREY P & ELLEN	101	739 HIGH ST	HIGH ST 739	0.604123	C1	$25,600	$105,600	$131,200		280.27	0.006434	$273		$273
28-006-000	TORREY, WILLIAM A III	101	704 HIGH ST	HIGH ST 704	0.238630	R1	$19,700	$110,800	$130,500		124.18	0.002851	$235		$235
27-214-000	JACKSON, WILLIAM N	101	695 HIGH ST	HIGH ST 695	0.151461	R1	$16,800	$84,100	$100,900		202.22	0.004642	$515		$515
											28087.85	**0.6448083**	**$60,825**	**$703,400**	**$764,225**
															$770,000

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MAPLOT	OWNER_NAME	STATE_(	PROPERTY_L	SORT_PROPE	AC.	ZONING	ASSESSED CURRENT LAND VALUE	ASSESSED CURRENT BUILDING VALUE	ASSESSED CURRENT TOTAL	DISPLACE	DIRECT IMPACT (S.F.)	DIRECT IMPACT (AC.)	ASSESSED LAND VALUE OF IMPACT AREA	ASSESSED BUILDING VALUE OF IMPACT AREA	TOTAL ESTIMATED ACQUISITION COST
27-100-000	LESSARD, RICHARD P	390	185 WATER ST	WATER ST 185	0.101456	C1	$22,800	$0	$22,800		178.18	0.004090	$919		$919
27-105-000	GULLETT, DAVID W & MICHELE R	337	22 FRONT ST	FRONT ST 22	0.054349	CI	$19,900	$0	$19,900		204.06	0.004685	$1,715		$1,715
27-101-000	O'DARE, JAMES P & LAROCHELLE,	326	45 VINE ST	VINE ST 45	0.148531	C1	$39,100	$45,200	$84,300		439.34	0.010086	$2,655		$2,655
27-072-000	BLAKE, HALCYON	402	12 SCHOOL ST	SCHOOL ST 12	0.304910	C1	$31,200	$461,800	$493,000	YES	2646.70	0.060760	$6,217	$461,800	$468,017
28-115-000	SAGADAHOC COUNTY COURT HO	902	752 HIGH ST	HIGH ST 752	0.588984	C1	$38,200	$1,978,700	$2,016,900		88.10	0.002022	$131		$131
27-071-000	BATH IRON WORKS CORP	400	SCHOOL ST	SCHOOL ST	0.140060	C1	$24,400	$0	$24,400		188.41	0.004325	$754		$754
27-070-000	WIGHT, CARLTON E & EVA S	390	5 LEEMAN HWY	LEEMAN HWY 5	0.126514	C1	$24,200	$0	$24,200		689.99	0.015840	$3,030		$3,030
27-138-000	CITY OF BATH	903	15 COMMERCIAL S	COMMERCIAL ST 1	0.201794	C1	$28,100	$88,600	$116,700		128.05	0.002940	$409		$409
27-069-000	WIGHT, CARLTON E & EVA S	325	36 SCHOOL ST	SCHOOL ST 36	0.077266	C1	$21,800	$73,600	$95,400	YES	695.91	0.015976	$4,507	$73,600	$78,107
27-017-000	VAN REENEN, KRISTIN MARGUERI	326	160 CENTRE ST	CENTRE ST 160	0.152600	C1	$15,600	$136,100	$151,700		307.63	0.007062	$722		$722
27-136-000	BATH IRON WORKS CORP	400	COMMERCIAL ST	COMMERCIAL ST	0.208785	C1	$20,600	$0	$20,600		1913.59	0.043930	$4,334		$4,334
27-139-000	BATH IRON WORKS CORP	400	743 WASHINGTON	WASHINGTON ST 7	0.167249	C1	$29,600	$0	$29,600		327.76	0.007524	$1,332		$1,332
27-002-000	GUIDI, JAMES P	340	746 HIGH ST	HIGH ST 746	0.172991	C2	$26,600	$135,200	$161,800	YES	1045.00	0.023990	$3,689	$135,200	$138,889
27-018-000	PARKER, JEFFREY P & ELLEN M	101	739 HIGH ST	HIGH ST 739	0.604123	C1	$25,600	$105,600	$131,200		280.27	0.006434	$273		$273
27-174-000	UNITED STATES POSTAL SERVICE	900	750 WASHINGTON	WASHINGTON ST 7	1.464950	C1	$60,000	$2,185,000	$2,245,000		2465.73	0.056605	$2,318		$2,318
27-001-000	BOUDREAU, EDWARD H & MARGA	105	738 HIGH ST	HIGH ST 738	0.291936	C2	$20,500	$87,400	$107,900		855.62	0.019642	$1,379		$1,379
27-175-000	KING, WILLIAM F JR & SUSAN D	337	10 FRANKLIN ST	FRANKLIN ST 10	0.160494	C1	$23,000	$0	$23,000		731.95	0.016803	$2,408		$2,408
27-180-000	NEAL, NAN-ELIZABETH	121	723 MIDDLE ST	MIDDLE ST 723	0.230648	R1	$19,400	$64,500	$83,900	YES	799.40	0.018352	$1,544	$64,500	$66,044
27-212-000	HARRINGTON, BARBARA A	031	709 HIGH ST	HIGH ST 709	0.197148	R1	$18,400	$108,500	$126,900		182.47	0.004189	$391		$391
27-068-000	BATH IRON WORKS CORP	400	108 CENTRE ST	CENTRE ST 108	1.207490	C1	$209,100	$577,400	$786,500		968.53	0.022234	$3,850		$3,850
28-006-000	TORREY, WILLIAM A III	101	704 HIGH ST	HIGH ST 704	0.238630	R1	$19,700	$110,800	$130,500		124.18	0.002851	$235		$235
28-007-000	BUCK, BARBARA A	101	712 HIGH ST	HIGH ST 712	0.196343	R1	$18,400	$84,600	$103,000		949.44	0.021796	$2,043		$2,043
27-214-000	JACKSON, WILLIAM N	101	695 HIGH ST	HIGH ST 695	0.151461	R1	$16,800	$84,100	$100,900		202.22	0.004642	$515		$515
27-176-000	KING, WILLIAM F JR	325	735 MIDDLE ST	MIDDLE ST 735	0.193451	C1	$27,600	$71,100	$98,700	YES	496.97	0.011409	$1,628	$71,100	$72,728
											16909.50	**0.388189**	**$46,999**	**$806,200**	**$853,199**
															$860,000

Maine Department of Transportation
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MAPLOT	OWNER_NAME	STAT	PROPERTY_L	SORT_PROPE	AC.	ZONING	ASSESSED CURRENT LAND VALUE	ASSESSED CURRENT BUILDING VALUE	ASSESSED CURRENT TOTAL	DISPLACE	DIRECT IMPACT (S.F.)	DIRECT IMPACT (AC.)	ASSESSED LAND VALUE OF IMPACT AREA	ASSESSED BUILDING VALUE OF IMPACT AREA	TOTAL ESTIMATED ACQUISITION COST
27-068-000	BATH IRON WORKS CORP	400	108 CENTRE ST	CENTRE ST 10	1.207490	C1	$209,100	$577,400	$786,500		968.53	0.022234	$3,850		$3,850
27-100-000	LESSARD, RICHARD P	390	185 WATER ST	WATER ST 185	0.101456	C1	$22,800	$0	$22,800		178.18	0.004090	$919		$919
27-105-000	GULLETT, DAVID W & MICHELE R	337	22 FRONT ST	FRONT ST 22	0.054349	CI	$19,900	$0	$19,900		204.06	0.004685	$1,715		$1,715
27-101-000	O'DARE, JAMES P & LAROCHELLE, GER	326	45 VINE ST	VINE ST 45	0.148531	C1	$39,100	$45,200	$84,300		399.37	0.009168	$2,413		$2,413
27-072-000	BLAKE, HALCYON	402	12 SCHOOL ST	SCHOOL ST 1	0.304910	C1	$31,200	$461,800	$493,000	YES	211.32	0.004851	$496	$461,800	$462,296
28-115-000	SAGADAHOC COUNTY COURT HOUSE	902	752 HIGH ST	HIGH ST 752	0.588984	C1	$38,200	$1,978,700	$2,016,900		88.10	0.002022	$131		$131
27-138-000	CITY OF BATH	903	15 COMMERCIAL ST	COMMERCIAL S	0.201794	C1	$28,100	$88,600	$116,700		522.43	0.011993	$1,670		$1,670
27-069-000	WIGHT, CARLTON E & EVA S	325	36 SCHOOL ST	SCHOOL ST 3	0.077266	C1	$21,800	$73,600	$95,400	YES	242.02	0.005556	$1,568	$73,600	$75,168
27-017-000	VAN REENEN, KRISTIN MARGUERITE	326	160 CENTRE ST	CENTRE ST 16	0.152600	C1	$15,600	$136,100	$151,700		310.77	0.007134	$729		$729
27-136-000	BATH IRON WORKS CORP	400	COMMERCIAL ST	COMMERCIAL S	0.208785	C1	$20,600	$0	$20,600		4844.74	0.111220	$10,974		$10,974
27-139-000	BATH IRON WORKS CORP	400	743 WASHINGTON ST	WASHINGTON S	0.167249	C1	$29,600	$0	$29,600		401.95	0.009228	$1,633		$1,633
27-002-000	GUIDI, JAMES P	340	746 HIGH ST	HIGH ST 746	0.172991	C2	$26,600	$135,200	$161,800	YES	1045.00	0.023990	$3,689	$135,200	$138,889
27-018-000	PARKER, JEFFREY P & ELLEN M	101	739 HIGH ST	HIGH ST 739	0.604123	C1	$25,600	$105,600	$131,200		280.27	0.006434	$273		$273
27-001-000	BOUDREAU, EDWARD H & MARGARET	105	738 HIGH ST	HIGH ST 738	0.291936	C2	$20,500	$87,400	$107,900		855.62	0.019642	$1,379		$1,379
27-176-000	KING, WILLIAM F JR	325	735 MIDDLE ST	MIDDLE ST 735	0.193451	C1	$27,600	$71,100	$98,700	YES	496.97	0.011409	$1,628	$71,100	$72,728
28-007-000	BUCK, BARBARA A	101	712 HIGH ST	HIGH ST 712	0.196343	R1	$18,400	$84,600	$103,000		949.44	0.021796	$2,043		$2,043
28-006-000	TORREY, WILLIAM A III	101	704 HIGH ST	HIGH ST 704	0.238630	R1	$19,700	$110,800	$130,500		124.18	0.002851	$235		$235
27-212-000	HARRINGTON, BARBARA A	031	709 HIGH ST	HIGH ST 709	0.197148	R1	$18,400	$108,500	$126,900		182.47	0.004189	$391		$391
27-214-000	JACKSON, WILLIAM N	101	695 HIGH ST	HIGH ST 695	0.151461	R1	$16,800	$84,100	$100,900		202.22	0.004642	$515		$515
											12507.64	**0.287136**	**$36,252**	**$741,700**	**$777,952**
															$780,000

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Maine Department of Transportation
Bath Feasibility Study

MAPLOT	OWNER_NAME	STATI	PROPERTY_L	SORT_PROPE	AC.	ZONING	ASSESSED CURRENT LAND VALUE	ASSESSED CURRENT BUILDING VALUE	ASSESSED CURRENT TOTAL	DISPLACE	DIRECT IMPACT (S.F.)	DIRECT IMPACT (AC.)	ASSESSED LAND VALUE OF IMPACT AREA	ASSESSED BUILDING VALUE OF IMPACT AREA	TOTAL ESTIMATED ACQUISITION COST
31-022-000	HYDE SCHOOL	904	616 HIGH ST	HIGH ST 616	125.909000	R1	$2,148,000	$7,440,400	$9,588,400		294839.47	6.768583	$115,472		$115,472
32-063-000	LEBEL, AGNES E	101	48 RUSSELL ST	RUSSELL ST 48	0.351208	R1	$21,600	$40,300	$61,900		107.08	0.002458	$151		$151
32-053-000	HASENFUS, PAUL S	031	552 WASHINGTON S	WASHINGTON ST	0.211730	C2	$28,100	$86,100	$114,200	YES	1399.52	0.032129	$4,264	$86,100	$90,364
32-052-000	CITY OF BATH	903	12 CASTINE AVE	CASTINE AVE 12	0.138140	C2	$24,700	$17,200	$41,900		1114.31	0.025581	$4,574		$4,574
32-051-000	CITY OF BATH	903	CASTINE AVE	CASTINE AVE	0.175642	C2	$26,600	$0	$26,600		1494.67	0.034313	$5,196		$5,196
32-050-000	CITY OF BATH	903	CASTINE AVE	CASTINE AVE	0.110414	C2	$23,300	$0	$23,300		1139.25	0.026154	$5,519		$5,519
32-049-000	CITY OF BATH	903	7 CASTINE AVE	CASTINE AVE 7	0.067458	C2	$21,400	$0	$21,400		832.41	0.019110	$6,062		$6,062
32-047-000	KELLEY, PETER J	337	CASTINE AVE	CASTINE AVE	0.093461	C2	$9,700	$0	$9,700		860.88	0.019763	$2,051		$2,051
32-046-000	CITY OF BATH	903	RUSSELL ST	RUSSELL ST	0.045356	R1	$13,600	$0	$13,600		1975.71	0.045356	$13,600		$13,600
32-048-000	CITY OF BATH	903	5 CASTINE AVE	CASTINE AVE 5	0.122461	C2	$23,800	$0	$23,800		1465.96	0.033654	$6,541		$6,541
32-035-000	GAGNE, NAPOLEON H	101	4 CASTINE AVE	CASTINE AVE 4	0.246122	R1	$20,000	$52,200	$72,200		16.76	0.000385	$31		$31
32-045-000	CENTRAL MAINE POWER	424	WASHINGTON ST	WASHINGTON ST	2.079660	C2	$118,400	$4,500	$122,900		29432.34	0.675674	$38,468		$38,468
32-012-000	JACKSON, WILLIAM N & ROB	101	36 HINCKLEY ST	HINCKLEY ST 36	0.216536	R1	$19,000	$48,700	$67,700		8072.29	0.185314	$16,260		$16,260
33-014-000	LEONARD, JOHN B & KATHLE	101	485 HIGH ST	HIGH ST 485	0.296447	R1	$20,800	$29,700	$50,500	YES	12913.23	0.296447	$20,800	$29,700	$50,500
30-001-000	TRUDELL, PAUL M & ELLEN M	101	14 STATE RD	STATE RD 14	1.449950	C4	$48,100	$39,800	$87,900		2514.12	0.057716	$1,915		$1,915
	WEST BATH PARCEL										96659.93	2.219007	$37,527		$37,527
34-029-000	DAUPHIN, HAROLD & KATHY	101	1 NICHOLS ST	NICHOLS ST 1	0.453957	R1	$23,200	$53,600	$76,800	YES (2 BLDGS)	15823.65	0.363261	$18,565	$53,600	$72,165
34-028-000	DAUPHIN, HAROLD E & KATH	101	3 NICHOLS ST	NICHOLS ST 3	0.257631	R1	$20,200	$85,100	$105,300	YES (2 BLDGS)	6899.79	0.158397	$12,419	$85,100	$97,519
											477561.37	**10.963301**	**$309,416**	**$254,500**	**$563,916**
															$570,000

Maine Department of Transportation
Bath Feasibility Study

MAPLOT	OWNER_NAME	STATE_(	PROPERTY_L	SORT_PROPE	AC.	ZONING	ASSESSED CURRENT LAND VALUE	ASSESSED CURRENT BUILDING VALUE	ASSESSED CURRENT TOTAL	DISPLACE	DIRECT IMPACT (S.F.)	DIRECT IMPACT (AC.)	ASSESSED LAND VALUE OF IMPACT AREA	ASSESSED BUILDING VALUE OF IMPACT AREA	TOTAL ESTIMATED ACQUISITION COST
27-139-000	BATH IRON WORKS CORP	400	743 WASHINGTON	WASHINGTON ST 743	0.167249	C1	$29,600	$0	$29,600		2758.68	0.063331	$11,208		$11,208
27-174-000	UNITED STATES POSTAL SERV	900	750 WASHINGTON	WASHINGTON ST 750	1.464950	C1	$60,000	$2,185,000	$2,245,000		13392.66	0.307453	$12,592		$12,592
27-140-000	PAPADOPOULOS, NICK & BISS	326	737 WASHINGTON	WASHINGTON ST 737	0.156555	C1	$25,700	$230,600	$256,300	YES	6819.54	0.156555	$25,700	$230,600	$256,300
27-175-000	KING, WILLIAM F JR & SUSAN	337	10 FRANKLIN ST	FRANKLIN ST 10	0.160494	C1	$23,000	$0	$23,000		6991.12	0.160494	$23,000		$23,000
27-176-000	KING, WILLIAM F JR	325	735 MIDDLE ST	MIDDLE ST 735	0.193451	C1	$27,600	$71,100	$98,700	YES	2639.79	0.060601	$8,646	$71,100	$79,746
27-028-000	FOX, MONTE J & DEBRA ANN	104	734 MIDDLE ST	MIDDLE ST 734	0.119961	R1	$15,800	$44,500	$60,300	YES	5225.50	0.119961	$15,800	$44,500	$60,300
27-027-000	DELMASTRO, MICHELLE M	101	732 MIDDLE ST	MIDDLE ST 732	0.075639	R1	$14,600	$50,500	$65,100	YES	51.01	0.001171	$226	$50,500	$50,726
27-025-000	TATTERSALL, ROBERT B & RU	101	39 GRANITE ST	GRANITE ST 39	0.122498	R1	$15,800	$37,600	$53,400	YES	5336.01	0.122498	$15,800	$37,600	$53,400
27-026-000	WISEMAN, JUDITH A	101	37 GRANITE ST	GRANITE ST 37	0.094022	R1	$14,900	$42,700	$57,600	YES	4095.6	0.094022	$14,900	$42,700	$57,600
27-024-000	MOORE PROPERTIES INC	104	43 GRANITE ST	GRANITE ST 43	0.075911	R1	$14,600	$30,500	$45,100	YES	3306.68	0.075911	$14,600	$30,500	$45,100
27-023-000	AMBROSE, LESLIE L	101	47 GRANITE ST	GRANITE ST 47	0.117500	R1	$15,800	$45,600	$61,400	YES	5118.30	0.117500	$15,800	$45,600	$61,400
27-022-000	MILLER, PHILLIP E	101	53 GRANITE ST	GRANITE ST 53	0.119097	R1	$15,800	$48,600	$64,400	YES	5187.87	0.119097	$15,800	$48,600	$64,400
27-021-000	SIKORA, KATHLEEN T	104	57 GRANITE ST	GRANITE ST 57	0.079229	R1	$14,600	$41,300	$55,900	YES	3451.22	0.079229	$14,600	$41,300	$55,900
27-020-000	VOORHEES, ANN E	101	61 GRANITE ST	GRANITE ST 61	0.098341	R1	$15,200	$47,600	$62,800	YES	4283.73	0.098341	$15,200	$47,600	$62,800
28-007-000	BUCK, BARBARA A	101	712 HIGH ST	HIGH ST 712	0.196343	R1	$18,400	$84,600	$103,000		771.48	0.017711	$1,660		$1,660
28-008-000	REED, WILLIAM E	390	LEEMAN HWY	LEEMAN HWY	0.220209	R1	$3,300	$0	$3,300		1127.79	0.025890	$388		$388
28-010-000	BERT'S OIL SERVICE	334	82 LEEMAN HWY	LEEMAN HWY 82	0.524723	C4	$161,100	$91,300	$252,400	YES	10430.45	0.239450	$73,516	$91,300	$164,816
28-012-000	CUMBERLAND FARMS INC	325	100 LEEMAN HWY	LEEMAN HWY 100	0.354107	C4	$150,900	$76,800	$227,700	YES	15424.90	0.354107	$150,900	$76,800	$227,700
28-031-000	PYE, JUDITH LAKIN	101	12 COTTAGE ST	COTTAGE ST 12	0.107813	C4	$15,500	$22,000	$37,500	YES	4696.33	0.107813	$15,500	$22,000	$37,500
28-032-000	ANDERSON, JULIE-ELLEN	101	11 ELSINORE AVE	ELSINORE AVE 11	0.211043	C4	$18,700	$29,500	$48,200	YES	9193.03	0.211043	$18,700	$29,500	$48,200
28-042-000	FROHMILLER, CHARLES D & T	130	1 QUIMBY ST	QUIMBY ST 1	0.169905	C4	$17,400	$0	$17,400		7401.06	0.169905	$17,400		$17,400
28-043-000	FROHMILLER, CHARLES D & T	109	3 QUIMBY ST	QUIMBY ST 3	0.262147	C4	$20,200	$44,200	$64,400	YES	11419.12	0.262147	$20,200	$44,200	$64,400
28-048-000	C N BROWN CO	334	132 LEEMAN HWY	LEEMAN HWY 132	0.230276	C4	$144,200	$59,200	$203,400	YES	10030.82	0.230276	$144,200	$59,200	$203,400
28-049-000	DODGE, WILLIAM S	330	150 LEEMAN HWY	LEEMAN HWY 150	1.973210	C4	$300,000	$175,300	$475,300	YES	17676.39	0.405794	$61,696	$175,300	$236,996
	WEST BATH PARCELS										381230.00	8.751837	$10,000		$10,000
31-068-000	WALSH, THOMAS T INC	301	139 RICHARDSON	RICHARDSON ST 139	2.881360	C4	$435,000	$4,999,500	$5,434,500	YES	26502.68	0.608418	$91,853	$4,999,500	$5,091,353
31-067-000	BATH IRON WORKS CORP	400	11 STATE RD	STATE RD 11	4.397520	C4	$383,300	$737,200	$1,120,500		16656.80	0.382388	$33,330		$33,330
											581218.56	**13.3429421**	**$843,215**	**$6,188,400**	**$7,031,615**
															$7,040,000

Maine Department of Transportation
Bath Feasibility Study

MAPLOT	OWNER_NAME	STAT	PROPERTY_L	SORT_PROPE	AC.	ZONING	ASSESSED CURRENT LAND VALUE	ASSESSED CURRENT BUILDING VALUE	ASSESSED CURRENT TOTAL	DISPLACE	DIRECT IMPACT (S.F.)	DIRECT IMPACT (AC.)	ASSESSED LAND VALUE OF IMPACT AREA	ASSESSED BUILDING VALUE OF IMPACT AREA	TOTAL ESTIMATED ACQUISITION COST
27-139-000	BATH IRON WORKS CORP	400	743 WASHINGTON ST	WASHINGTON ST 7	0.167249	C1	$29,600	$0	$29,600		2758.68	0.063331	$11,208		$11,208
27-174-000	UNITED STATES POSTAL SERVIC	900	750 WASHINGTON ST	WASHINGTON ST 7	1.464950	C1	$60,000	$2,185,000	$2,245,000		13392.66	0.307453	$12,592		$12,592
27-140-000	PAPADOPOULOS, NICK & BISSIAS	326	737 WASHINGTON ST	WASHINGTON ST 7	0.156555	C1	$25,700	$230,600	$256,300	YES	6819.54	0.156555	$25,700	$230,600	$256,300
27-175-000	KING, WILLIAM F JR & SUSAN D	337	10 FRANKLIN ST	FRANKLIN ST 10	0.160494	C1	$23,000	$0	$23,000		6991.12	0.160494	$23,000		$23,000
27-176-000	KING, WILLIAM F JR	325	735 MIDDLE ST	MIDDLE ST 735	0.193451	C1	$27,600	$71,100	$98,700	YES	2639.79	0.060601	$8,646	$71,100	$79,746
27-028-000	FOX, MONTE J & DEBRA ANN	104	734 MIDDLE ST	MIDDLE ST 734	0.119961	R1	$15,800	$44,500	$60,300	YES	5225.50	0.119961	$15,800	$44,500	$60,300
27-025-000	TATTERSALL, ROBERT B & RUTH	101	39 GRANITE ST	GRANITE ST 39	0.122498	R1	$15,800	$37,600	$53,400	YES	5336.01	0.122498	$15,800	$37,600	$53,400
27-026-000	WISEMAN, JUDITH A	101	37 GRANITE ST	GRANITE ST 37	0.094022	R1	$14,900	$42,700	$57,600	YES	4095.6	0.094022	$14,900	$42,700	$57,600
27-027-000	DELMSTRO, MICHELLE M	101	732 MIDDLE ST	MIDDLE ST 732	0.075639	R1	$14,600	$50,500	$65,100	YES	51.01	0.001171	$226	$50,500	$50,726
27-024-000	MOORE PROPERTIES INC	104	43 GRANITE ST	GRANITE ST 43	0.075911	R1	$14,600	$30,500	$45,100	YES	3306.68	0.075911	$14,600	$30,500	$45,100
27-023-000	AMBROSE, LESLIE L	101	47 GRANITE ST	GRANITE ST 47	0.117500	R1	$15,800	$45,600	$61,400	YES	5118.30	0.117500	$15,800	$45,600	$61,400
27-022-000	MILLER, PHILLIP E	101	53 GRANITE ST	GRANITE ST 53	0.119097	R1	$15,800	$48,600	$64,400	YES	5187.87	0.119097	$15,800	$48,600	$64,400
27-021-000	SIKORA, KATHLEEN T	104	57 GRANITE ST	GRANITE ST 57	0.079229	R1	$14,600	$41,300	$55,900	YES	3451.22	0.079229	$14,600	$41,300	$55,900
27-020-000	VOORHEES, ANN E	101	61 GRANITE ST	GRANITE ST 61	0.098341	R1	$15,200	$47,600	$62,800	YES	4283.73	0.098341	$15,200	$47,600	$62,800
28-007-000	BUCK, BARBARA A	101	712 HIGH ST	HIGH ST 712	0.196343	R1	$18,400	$84,600	$103,000		771.48	0.017711	$1,660		$1,660
28-008-000	REED, WILLIAM E	390	LEEMAN HWY	LEEMAN HWY	0.220209	R1	$3,300	$0	$3,300		1127.79	0.025890	$388		$388
28-010-000	BERT'S OIL SERVICE	334	82 LEEMAN HWY	LEEMAN HWY 82	0.524723	C4	$161,100	$91,300	$252,400	YES	10430.45	0.239450	$73,516	$91,300	$164,816
28-012-000	CUMBERLAND FARMS INC	325	100 LEEMAN HWY	LEEMAN HWY 100	0.354107	C4	$150,900	$76,800	$227,700	YES	15424.9	0.354107	$150,900	$76,800	$227,700
28-031-000	PYE, JUDITH LAKIN	101	12 COTTAGE ST	COTTAGE ST 12	0.107813	C4	$15,500	$22,000	$37,500	YES	4696.33	0.107813	$15,500	$22,000	$37,500
28-032-000	ANDERSON, JULIE-ELLEN	101	11 ELSINORE AVE	ELSINORE AVE 11	0.211043	C4	$18,700	$29,500	$48,200	YES	9193.03	0.211043	$18,700	$29,500	$48,200
28-042-000	FROHMILLER, CHARLES D & THE	130	1 QUIMBY ST	QUIMBY ST 1	0.169905	C4	$17,400	$0	$17,400		7401.06	0.169905	$17,400		$17,400
28-043-000	FROHMILLER, CHARLES D & THE	109	3 QUIMBY ST	QUIMBY ST 3	0.262147	C4	$20,200	$44,200	$64,400	YES	11419.12	0.262147	$20,200	$44,200	$64,400
28-048-000	C N BROWN CO	334	132 LEEMAN HWY	LEEMAN HWY 132	0.230276	C4	$144,200	$59,200	$203,400	YES	10030.82	0.230276	$144,200	$59,200	$203,400
28-049-000	DODGE, WILLIAM S	330	150 LEEMAN HWY	LEEMAN HWY 150	1.973210	C4	$300,000	$175,300	$475,300	YES	17676.39	0.405794	$61,696	$175,300	$236,996
	WEST BATH PARCELS										369528.00	8.483196	$18,000		$18,000
31-068-000	WALSH, THOMAS T INC	301	139 RICHARDSON ST	RICHARDSON ST 1	2.881360	C4	$435,000	$4,999,500	$5,434,500	YES	21133.00	0.485147	$73,243	$4,999,500	$5,072,743
31-067-000	BATH IRON WORKS CORP	400	11 STATE RD	STATE RD 11	4.397520	C4	$383,300	$737,200	$1,120,500		18385.01	0.422062	$36,788		$36,788
											565875.09	**12.99070455**	**$836,063**	**$6,188,400**	**$7,024,463**
															$7,030,000

MAPLOT	OWNER_NAME	STATE_C	PROPERTY_L	AC.	ZONING	MAILING_AD	ASSESSED CURRENT LAND VALUE	ASSESSED CURRENT BUILDING VALUE	ASSESSED CURRENT TOTAL	DISPLACE	DIRECT IMPACT (S.F.)	DIRECT IMPACT (AC.)	ASSESSED LAND VALUE OF IMPACT AREA	ASSESSED BUILDING VALUE OF IMPACT AREA	TOTAL ESTIMATED ACQUISITION COST
27-065-000	BURGESS, CRAIG R	337	801 MIDDLE ST	0.318340	C1	87 WHISKEAG RD	$31,700	$0	$31,700		449.93	0.010329	$1,029	$0	$1,029
27-077-000	PERFORMING ARTS CENTER E	904	804 WASHINGTON S	0.620421	C1	798 WASHINGTON S	$38,900	$645,800	$684,700		327.03	0.007508	$471	$0	$471
27-067-000	BURGESS, CRAIG R	340	101 CENTRE ST	0.328883	C1	87 WHISKEAG RD	$31,900	$154,600	$186,500	YES	6563.82	0.150685	$14,616	$154,600	$169,216
27-068-000	BATH IRON WORKS CORP	400	108 CENTRE ST	1.207490	C1	700 WASHINGTON S	$209,100	$577,400	$786,500	YES	8160.30	0.187335	$32,441	$786,500	$818,941
27-139-000	BATH IRON WORKS CORP	400	743 WASHINGTON S	0.167249	C1	WASHINGTON ST 74	$29,600	$0	$29,600		7285.37	0.167249	$29,600	$0	$29,600
27-140-000	PAPADOPOULOS, NICK&BISSIA	326	737 WASHINGTON S	0.156555	C1	WASHINGTON ST 73	$25,700	$230,600	$256,300	YES	75.18	0.001726	$283	$230,600	$230,883
27-072-000	BLAKE, HALCYON	402	12 SCHOOL ST	0.304910	C1	12 SCHOOL ST	$31,200	$461,800	$493,000	YES	13281.88	0.304910	$31,200	$461,800	$493,000
27-073-000	ZHU, LI XIAO & WANG, LEI	326	5 SCHOOL ST	0.137428	C1	86 BOURNE AVE	$24,700	$92,200	$116,900	YES	3542.52	0.081325	$14,617	$92,200	$106,817
											39686.03	**0.911066**	**$124,255**	**$1,725,700**	**$1,849,955**
															$1,850,000

HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005.513

Date: November 22, 2004

From: Irene Hauzar, Sheryl Campbell

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Right of Way and Property Inventory
Crossover for C-1
Preliminary Right of Way Impacts and Estimated
Acquisition Costs

Methodology

Information on right of way and property in the Study Area was obtained through the 2003 Geographic Information System (GIS) property files from the City of Bath Assessor's Department. The preliminary property acquisition costs were estimated based on the assessed value of both the land and buildings. Personal communications with City of Bath officials were conducted. Limited field reconnaissance was conducted for this component of the study.

Proposed property impacts were determined by overlaying the proposed right of way limits over the City of Bath Assessor's Department GIS files. If the proposed right of way limit encroached upon a building, the value of the building was included in the total property impact calculation.

A spreadsheet showing the calculation for the property impacts and preliminary right of way acquisition costs for the Crossover area is attached. These acquisition costs have been rounded up to the nearest ten thousand dollars.

Information Sources

The City of Bath Assessor's Department provided GIS files that contained the assessed value of both the land and buildings for each parcel located in the Study Area. This data was current as of April 2003.

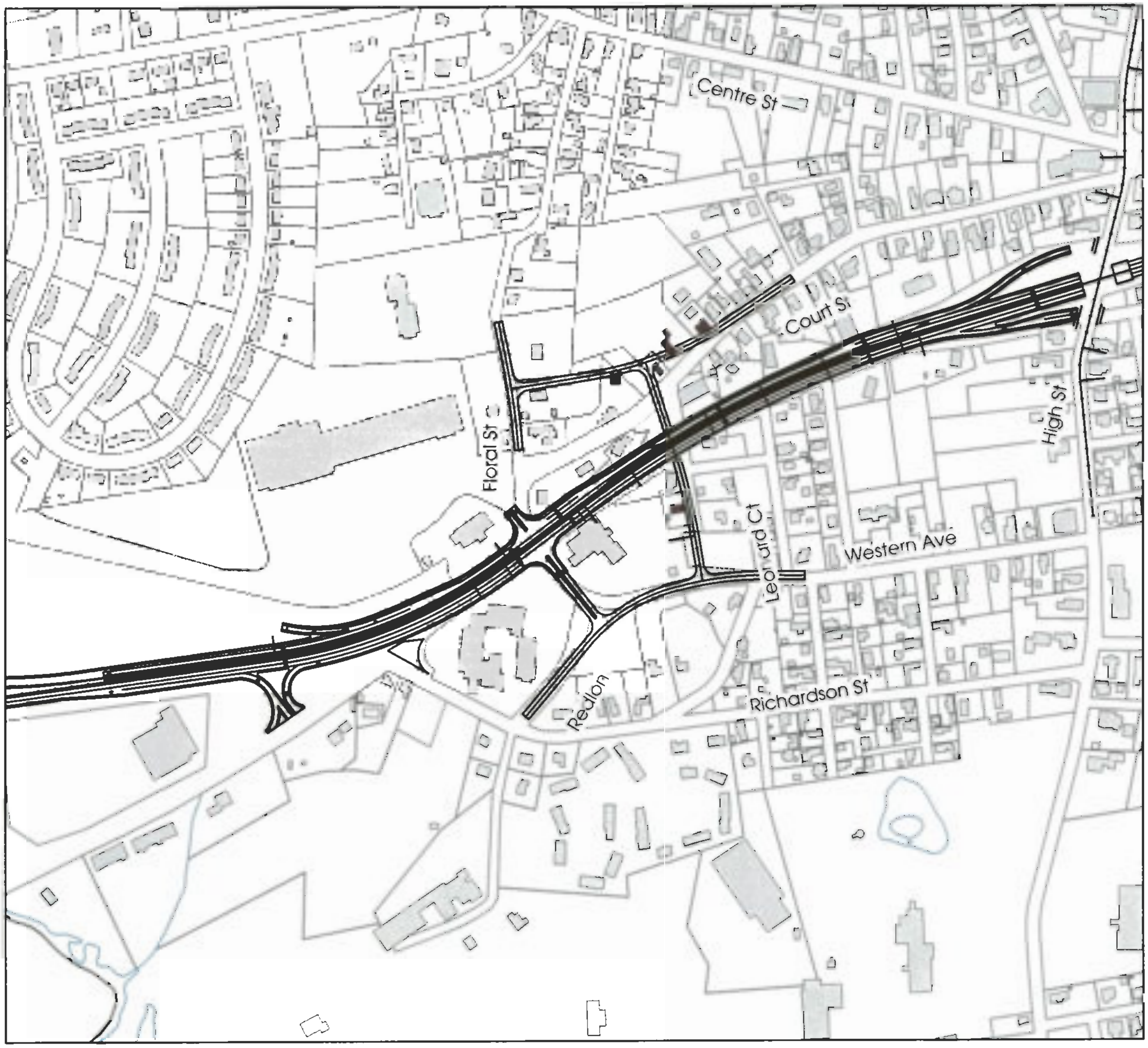
Baseline Information

Existing right of way and property lines are illustrated on the attached sketch which also illustrates the structures that would need to be acquired, based on the conceptual design.

Property Impacts and Estimated Acquisition Cost

The following table summarizes the anticipated property impacts and estimated property acquisition costs for the Crossover. **Please note that these Crossover impacts and estimated acquisition costs must be added to those of C-1 to determine the full impact of Option C-1 with Crossover.**

Option	Estimated Number of Structures to be Acquired	Estimated Land Area to be Acquired in Acres	Estimated Acquisition Cost
Crossover	6	1.5108228	$350,000



Building(s) to be displaced

Property Lines

Option

Bath Feasibility Study
Crossover for C1
Right of Way and Property Inventory and Impacts
Maine DOT PIN 10123.00

Maine Department of Transportation
Bath Feasibility Study

MAPLOT	OWNER_NAME	STATE	PROPERTY_L	SORT_PROPE	AC.	ZONING	ASSESSED CURRENT LAND VALUE	ASSESSED CURRENT BUILDING VALUE	ASSESSED CURRENT TOTAL	DISPLACE	DIRECT IMPACT (S.F.)	DIRECT IMPACT (AC.)	ASSESSED LAND VALUE OF IMPACT AREA	ASSESSED BUILDING VALUE OF IMPACT AREA	TOTAL ESTIMATED ACQUISITION COST
28-152-000	MEAD, ELLIOT L & JEAN L	101	52 FLORAL ST	FLORAL ST 52	0.890160	R1	$21,200	$111,300	$132,500		4259.35	0.097781	$2,329		$2,329
28-084-000	HANNA, THOMAS L & CHARMAINE A	101	113 COURT ST	COURT ST 113	1.319300	C2	$33,200	$53,400	$86,000	YES	5815.53	0.133506	$3,360	$53,400	$56,760
28-153-000	UPHAM, A CATHERINE	101	82 FLORAL ST	FLORAL ST 82	0.700144	R1	$20,400	$37,800	$58,200		5800.54	0.133162	$3,880		$3,880
28-081-000	GILMORE, KEVIN R & BENSON P	325	131 COURT ST	COURT ST 131	0.476000	C4	$35,800	$38,200	$74,000	YES	1668.53	0.038304	$2,881	$10,000	$12,881
28-048-000	CN BROWN CO	334	132 LEEMAN HWY	LEEMAN HWY 132	0.230276	C4	$144,200	$59,200	$203,400	YES	1339.29	0.030746	$19,253	$59,200	$78,453
28-046-000	FROHMILLER, CHARLES D & THERESA	130	LEONARD CT	LEONARD CT	0.511528	C4	$21,700	$0	$21,700		4603.54	0.105683	$4,483		$4,483
31-069-000	DODGE, WILLIAM S	390	WESTERN AVE	WESTERN AVE	0.740445	C4	$11,100	$0	$11,100		8791.38	0.201822	$3,026		$3,026
31-074-000	BRILLARD, JULIE A J & PAUL A	105	79 RICHARDSON ST	RICHARDSON ST 7	0.618058	R1	$24,600	$59,500	$84,100		349.29	0.008019	$319		$319
28-049-000	DODGE, WILLIAM S	330	150 LEEMAN HWY	LEEMAN HWY 150	1.973210	C4	$300,000	$175,300	$475,300		332.92	0.007643	$1,162		$1,162
28-082-000	GILMORE, KEVIN P & BENSON R	390	127 COURT ST	COURT ST 127	0.323800	C2	$3,800	$0	$3,800		14104.73	0.323800	$3,800		$3,800
28-086-000	WEBSTER, CARL H	101	103 COURT ST	COURT ST 103	0.176443	C2	$17,800	$62,000	$79,800	YES	7685.86	0.176443	$17,800	$62,000	$79,800
28-083-000	BARTER, FREDERICK R & LINDA	101	121 COURT ST	COURT ST 121	0.096258	C2	$15,200	$21,000	$36,200	YES	4192.99	0.096258	$15,200	$21,000	$36,200
28-047-000	HINDS, DALE P AND BEVERLY E	101	5 LEONARD CT	LEONARD CT 5	0.157656	C4	$17,100	$42,800	$59,900	YES	6867.49	0.157656	$17,100	$42,800	$59,900
															$0
															$0
											65811.44	**1.5108228**	**$94,592**	**$248,400**	**$342,992**
															$350,000

The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005.513 **Date:** March 5, 2004

From: Irene Hauzar

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Sensitive Noise Receptor Inventory

Methodology

Information on sensitive noise receptors was obtained to develop a preliminary inventory of sensitive noise receptors in the Study Corridors. This information was obtained by examining the City of Bath Geographic Information Systems (GIS) database for land uses that meet Federal Highway Administration (FHWA) criteria for sensitive noise receptors. Sensitive noise receptors, as defined within the FHWA Traffic Noise Analysis and Abatement Policy and Guidance document, include residences, schools, parks, churches, nursing homes, hospitals and libraries. Study Corridors 500 feet wide were delineated within the immediate area of Route 1 and along one potential alignment of a new Route 209 Spur. The City of Bath GIS database was queried for these types of land uses, which were then mapped within the 500 foot wide Study Corridors. In addition, personal communications with City of Bath officials were conducted. Limited field reconnaissance was conducted for this component of the study. Noise measurements and noise modeling were not conducted as part of the Bath Feasibility Study.

Information Sources

The City of Bath GIS database was searched for locations of sensitive noise receptors within the Study Corridors. In addition, the Federal Highway Administration Highway Traffic Noise Analysis and Abatement Policy and Guidance document (June 1995) and the Maine Department of Transportation (MDOT) Highway Traffic Noise Policy (1998) were consulted regarding applicable noise policy and guidelines.

Results of Inventory

Sensitive noise receptors located within the Study Corridors are shown on page 3 of 3.

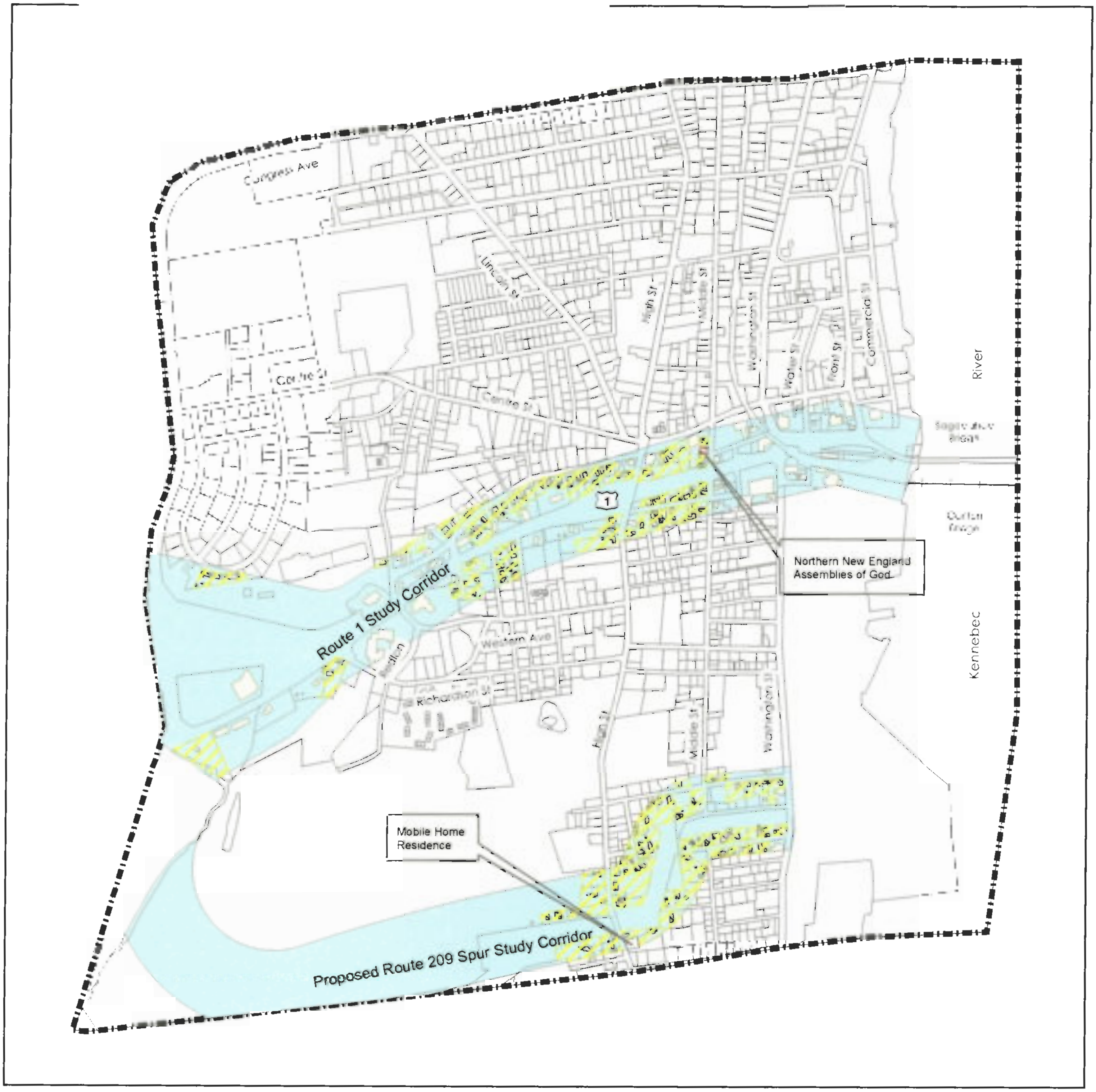
Sensitive noise receptors located within the 500 foot wide Route 1 Study Corridor include 58 single family residential structures and19 multi-family residential structures. In addition, one place of worship (Northern New England Assemblies of God) is located within the Route 1 Study Corridor.

The Route 209 Spur Study Corridor contains 48 single family residential structures and 13 multi-family residential structures. In addition, one mobile home residence is located within the Route 209 Spur Study Corridor.

There are no schools, parks, nursing homes, hospitals or libraries located within either the Route 1 Study Corridor or the Route 209 Spur Study Corridor.

It is likely that some of these sensitive noise receptors are currently affected by traffic noise and may be affected by traffic noise associated with the various improvement options. Therefore, a noise impact assessment, and consideration of noise abatement measures may be required as part of subsequent NEPA documentation.

In addition, noise associated with construction activities may need to be evaluated.



Study Area

Roadways

Property Lines

Study Corridor

Residences

Mobile Home

Church

Bath Feasibility Study
Sensitive Noise Locations

Maine DOT PIN 10123.00

0 250 500 1,000 1,500 2,000 Feet

HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005.513 **Date:** March 5, 2004

From: Irene Hauzar

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Uncontrolled Petroleums and Hazardous Materials
Inventory

Methodology

Information on uncontrolled petroleums and hazardous materials within the Study Area was reviewed based on an Environmental Site Assessment report prepared for the Maine Department of Transportation (MaineDOT) by S.W. Cole Engineering. Field reconnaissance was not conducted for this component of the study.

Information Sources

S.W. Cole Engineering prepared a Modified Phase I Environmental Site Assessment for the Route 1 Feasibility Study in May 2003 for the Maine DOT. Data collected as part of the Environmental Site Assessment included data collected from the FirstSearch Technology Corporation Environmental report. The FirstSearch Technology Corporation Environmental report includes data collected from 1989 to 2003. In addition, spill lists compiled by the Maine Department of Environmental Protection were reviewed for the Phase I Environmental Site Assessment.

Baseline Information

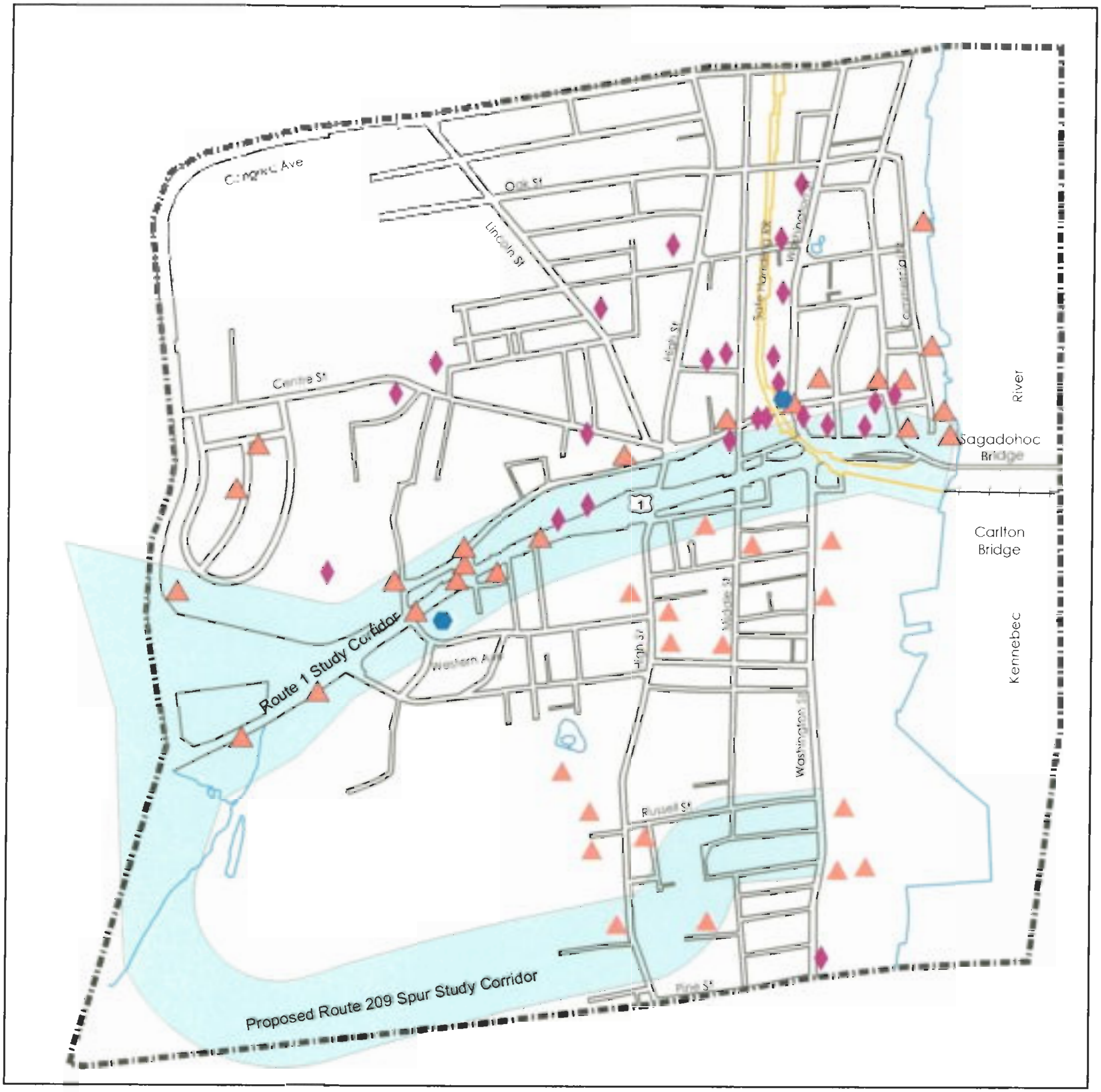
The Modified Phase I Environmental Site Assessment document for the Route 1 Feasibility Study identified numerous spill sites, underground storage tanks, and Resource Conservation and Recovery Act Generators (RCRAGN). Spills identified in the report pertain to the releases of petroleum products from leaking underground storage tanks, refueling operations, and historic industrial uses. Locations of underground storage tanks were mapped to identify potential contamination sites within the Study Area. Resource Conservation and Recovery Act Generators were identified as businesses/locations that are considered to be hazardous waste generators due to their operations.

Results of Inventory

Study Corridors 500 feet wide were delineated within the immediate area of Route 1 and along one potential alignment of a new Route 209 Spur.

As depicted in the Hazardous Waste Site Figure, page 3 of 3, the Route 1 Study Corridor contains several locations of petroleum and hazardous materials spills. These spills generally occurred at gas stations or during the delivery of household heating fuel. In addition, the Modified Phase I Environmental Site Assessment identified numerous underground storage tanks located at properties adjacent to Route 1. These sites have the potential to leak and cause soil contamination. Several spill sites are identified at the eastern end of the Route 209 Spur Study Corridor.

There is one Resource Conservation and Recovery Act Generator (RCRAGN) within the Route 1 Study Corridor. It is currently a vacant property: the former Dodge Auto Group (also known as the Bodwell Motors Site) located at the corner of Route 1 and Western Avenue was listed as a RCRAGN. Several spills have also been documented at this site. In addition, a dry cleaning business located on Centre Street, near but outside of the Route 1 Study Corridor and railroad right-of-way was listed as an RCRAGN. These properties are labeled on the attached figure as RCRAGN.



Composite Site Spill

Underground Storage Tank

RCRAGN

Study Area

Roadways

Study Corridor

Bath Feasibility Study
Hazardous Waste Sites

Maine DOT PIN 10123.00

Feet
0 250 500 1,000 1,500 2,000

HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005.513 **Date:** March 17, 2004

From: Irene Hauzar

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Zoning, Land Use, Future Development Inventory and
Main Street Bath

Methodology

Information on existing and future land use in the Study Area was obtained from the City of Bath Assessor and Planning Departments. In addition, Geographic Information System (GIS) data from the Maine Office of GIS was acquired. Field reconnaissance was not conducted for this component of the study.

Information Sources

The 2003 City of Bath Zoning Ordinances and the 1997 City of Bath Comprehensive Plan were consulted. Other sources of data included the Maine Office of GIS, the Mid-Coast Regional Planning Commission, the City of Bath website www.cityofbath.com, and the Main Street Program website www.mainstreet.org. In addition, interviews with the City of Bath Planning Director, Jim Upham were conducted.

Baseline Information

Zoning

The Study Area contains seven different zoning districts within the City of Bath, as depicted in the attached Zoning Figure, page 5 of 6. They are described as follows:

C1-Downtown Commercial District—The Downtown Commercial District provides a location for the retail, business, and tourist oriented activities of Bath. The Downtown Commercial District allows for some residential activity, which has historically been part of the downtown.

C2-Mixed Use Light Commercial District—The Mixed Use Light Commercial District is a mix of high-density residential and small-scale business activities that are oriented primarily to neighborhood goods and services. The intent of the zoning district is to accommodate a mix of uses, both residential and commercial, at neighborhood scales.

C3-Business Park District—The Business Park District provides an area that will encourage office, warehousing, high technology, communication, light industrial, research and development, marine-related construction, communications, and similar land uses. Currently, this area exists mainly as open space, which includes part of the recreational fields at the Hyde School. However, there are no plans to convert the recreational fields at the Hyde School into Business Park Development. There is also a small amount of manufacturing-related land use in this district.

C4—Route 1 Commercial Contract District—The Route 1 Commercial Contract District provides a location for the highway-oriented businesses needed by residents of the City of Bath, the region, and the public. The goal of this district is to encourage better appearances of the streetscape, such as by developing design standards. In addition, the goal of this district is to improve highway safety through recommending design strategies.

R1—High-Density Residential District. The High-Density Residential District provides for the maintenance and increased livability of the existing densely built-up areas of the City of Bath, and areas where a limited amount of high-density housing can be constructed. The high-density residential district provides areas of compact development that foster cohesive neighborhoods close to community services.

I—Industrial/Shipyard District—The Industrial/Shipyard District provides the location for the main facilities of the Bath Iron Works (BIW) and for support facilities. This is an industrial district that must serve industrial needs, while also controlling impacts on surrounding residential and commercial neighborhoods.

HO—Historic Overlay District—The purpose of the Historic Overlay District is to provide for the review of certain activities within this historic part of the City of Bath in order to prevent inappropriate alterations of buildings of historic or architectural value, to preserve the essential character of historic neighborhoods, and to ensure that new buildings or structures constructed in areas of architectural or historical significance are designed and built in a manner compatible with the character of the neighborhood.

Zoning within the Town of West Bath is predominately residential. Zoning along Route 1, in the Study Area is designated Business and Commercial. This zone is under the Shoreland Overlay Zone, which applies to all land areas within 250 feet of the normal high-water line and requires a 75 foot shore setback, with a minimum shore frontage of 150 feet.

Land Uses

Land Uses within the City of Bath within the Study Area consist of residential, commercial, industrial, educational, open space, business, and historic districts. Land Uses within the Town of West Bath within the Study Area include business and commercial land uses.

<u>Future Development</u>

Four developments are currently part of future development plans for the City of Bath. They are illustrated on the Future Development figure, page 6 of 6 and are described as follows:

1. Finast LLC Lot. This property is located within the Route 1 Study Corridor between Leeman Highway and Congress Avenue. It is currently owned by Bath Iron Works and functions as administrative offices. It is approximately 4.4 acres in size. A pre-application workshop was held in the Spring of 2003 in which a proposal was made to change the office type of land use of this parcel to commercial use. A proposal for an auto repair business and a drive through fast food restaurant has been proposed. In addition, the proposal included plans for a bank to be located on this parcel.
2. C.N. Brown. This property is located within the Route 1 Study Corridor on Route 1 northbound and Western Avenue. It is approximately 2 acres in size. This parcel is currently vacant and it was the former home of a car dealership. The dealership

building remains. Plans for this parcel included a multi-pump gas station with convenience store and car wash, operated by Big Apple.

3. Prawer Lot. This property is located between Front Street and Elm Streets in downtown Bath. It is approximately 2 acres in size and is currently vacant. The redevelopment of this parcel includes plans for a luxury hotel, proposed to be operated by the Marriott Hotel chain. Concept plans have been developed, which include a 100-room hotel along the river, that encompasses 2.4 acres.
4. The Coal Pocket lot, located adjacent to the Prawer Lot, bordering the Kennebec River and Commercial Street and Elm Streets is a vacant lot that has been slated to be an extension of the proposed Prawer Lot redevelopment. It is approximately 4.6 acres in size. The developer of the proposed hotel chain on the Prawer Lot has been in discussions with the current owner. Other development scenarios include developing condominiums on this property.

The City of Bath does not currently or in the forseeable future anticipate any residential subdivision development within the City. The housing development market in the City of Bath grew by 3.3 percent between 1990 and 2000 (147 units), much less than the regional increase of approximately 12.6 percent (1,856).

<u>Main Street Bath</u>

The National Main Street Program is implemented by the National Trust for Historic Preservation. The National Main Street Program was established in 1980 to improve all aspects of traditional downtowns by implementing economic management strategies, strengthening public participation, rehabilitating buildings and enhancing their appearance, and creating a sense of place. The program has been adopted by 44 states, including Maine. Main Street Bath is one of six communities in Maine that are currently part of this program.

Main Street Bath was incorporated in 2001 as one of the four initial Main Street Maine communities. The designation of a Main Street community qualifies a community to receive a 3-year package of training and technical assistance on revitalization provided by the Maine Downtown Center, a non-profit corporation that provides support and assistance to Maine's Main Street communities.

The underlying premise of the Main Street approach is to encourage economic development that is appropriate to current market conditions within the context of historic preservation. The Main Street Program advocates community self-reliance, empowerment, and the rebuilding of commercial districts based on traditional assets, which include: unique architecture; entrepreneurial opportunities; and, a sense of community.

The downtown commercial area of Bath is primarily located along Front Street, with adjacent commercial establishments located on the side streets. Downtown Bath consists of nineteenth century architecture with brick sidewalks and simulated gas street lamps. Contained within the downtown is a wide range of retail businesses housed in the architecturally historic buildings. Businesses that comprise the Bath Downtown include a department store, full service market, furniture stores, drug stores, gift shops, antique shops, clothing stores, a variety of restaurants and banks.

Mixed into the downtown commercial area of Bath are office uses and residential lofts located above the street level businesses. Vacancy rates as of Spring 2003 were at zero percent, indicating that the Bath Downtown district enjoys a high level of occupied storefronts and office space.

Results of Inventory

Zoning

The Zoning Figure on page 5 of 6 depicts the zoning districts within the Study Area. Within the Route 1 Study Corridor, the zoning includes C1, C2, C3, C4, I, R1, and the HO districts. C1 zoning allows for Downtown Commercial land uses. C2 zoning allows for a mixed use light commercial district. C3 zoning allows for business uses. The Route 1 Corridor also contains R1 zoning, which is high-density residential zoning. In addition, the Route 1 Study Corridor contains an area zoned for industrial land uses. Within the proposed Route 209 Spur Study Corridor, zoning is primarily C3, which allows for business park developments, and R1, which is high-density residential, and C2, which allows for mixed use light commercial land uses. Zoning within C4 encourages more aesthetically pleasing design standards.

Land Use

Land Uses along the Route 1 Study Corridor consist of strip development, which caters to auto-dependent uses, such as gas stations, car washes, and drive-thru restaurants. Other land uses found along Route 1 include a hotel, supermarket, banks and single family homes.

Land Uses along the Route 209 Spur Study Corridor consist of high density residential housing, open space associated with the Hyde School, and limited mixed use light commercial development.

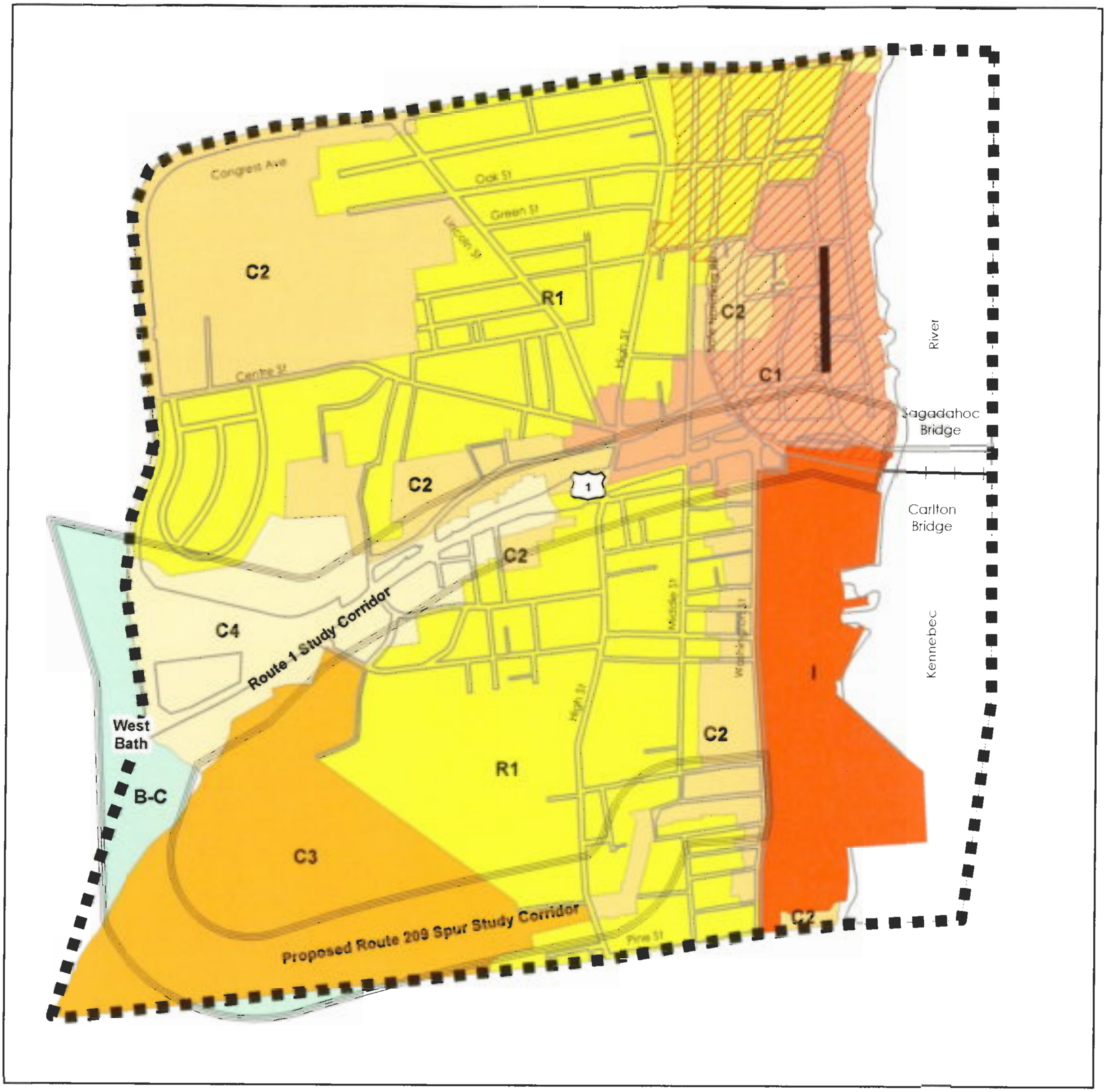
Land Uses along Route 1 in West Bath consist mainly of business and commercial uses.

Future Development

As shown on the Future Development figure, page 6 of 6, the Finast LLC Lot and C.N. Brown Lot are two redevelopment proposals that are proposed within the Route 1 Study Corridor. There are currently no redevelopment proposals for any property within the Route 209 Spur Study Corridor.

Main Street Bath

Properties within Main Street Bath District are adjacent to, but not within the Route 1 Study Corridor. (see Zoning figure, page 5 of 6).



Zoning

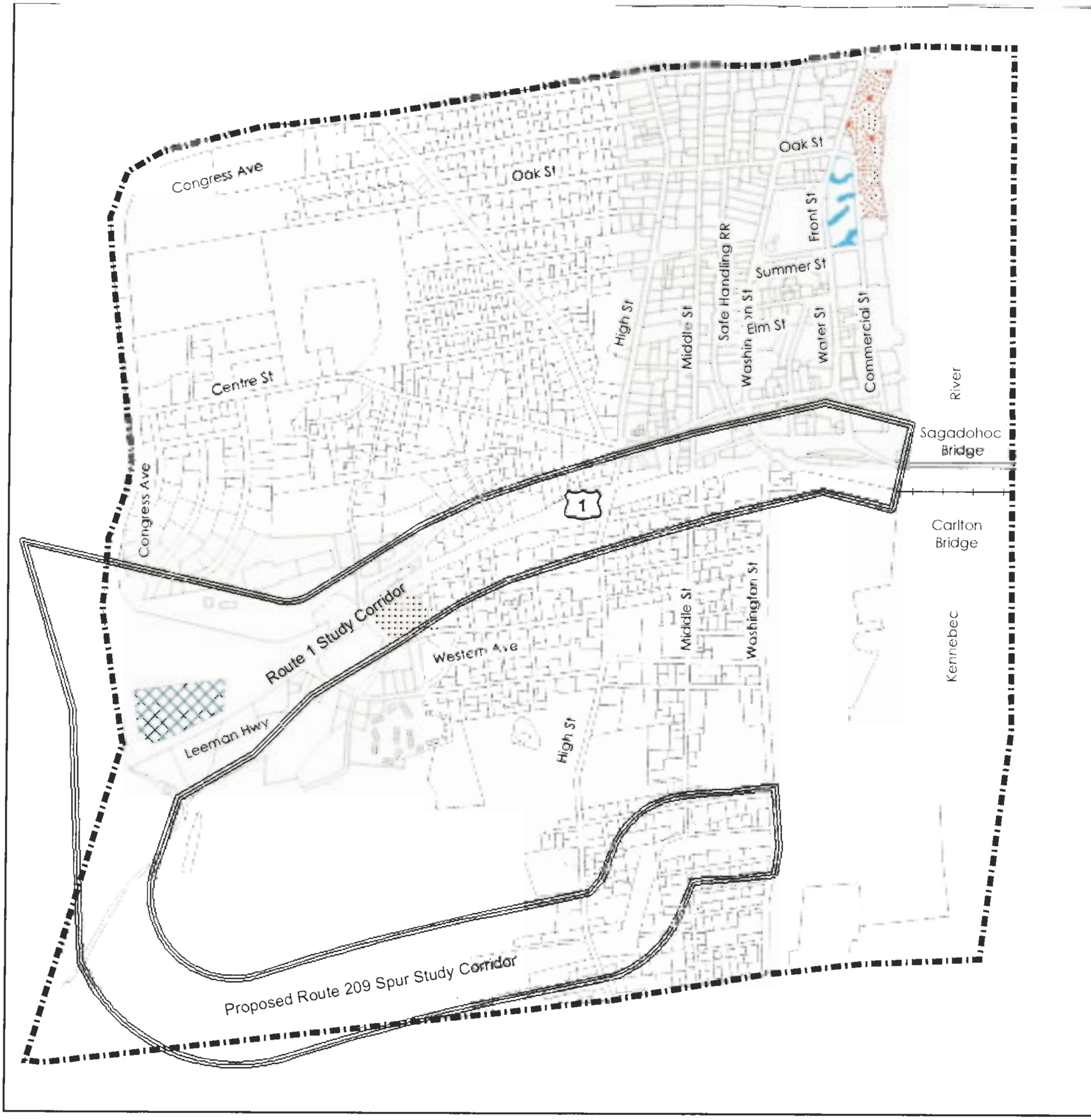
- C1 - Downtown Commercial District
- C2 - Mixed Use Light Commercial
- C3 - Business Park District
- C4 - Route 1 Commercial Contract District
- R1 - High-density Residential District
- I - Industrial/Shipyard District
- B-C Business and Commercial West Bath

- Study Area
- Roadways
- HO - Historic Overlay District
- Study Corridor
- Main Street Bath Program District

0 250 500 1,000 1,500 2,000 Feet

Bath Feasibility Study Zoning

Maine DOT PIN 10123.00



Finast LLC

C.N. Brown

Study Area

Study Corridor

Coal Pocket

Prawer Lot

Bath Feasibility Study Future Development

Maine DOT PIN 10123.00

0 250 500 1,000 1,500 2,000 Feet

Wilbur Smith Associates

April 2, 2004

TO: File

FROM: Bruce Hyman, AICP

SUBJECT: MaineDOT
Bath Feasibility Study
MaineDOT PIN # 10123.00
Economic Development: Build Options

TECHNICAL MEMO

Purpose

The purpose of this Technical Memorandum is to provide information related to the evaluation of the Build Options for the Route 1 Corridor relative to Economic Development.

Methodology

Information regarding Economic Development was collected through:

- Assembly of previous and ongoing plans and studies for the Route 1 Corridor from known/identified sources
- Public forums/meetings held during the study process and discussions at Steering Committee meetings
- Review of Population, Employment, Demographic and Economic Forecasts for the area (summarized in the *Economic Development: Existing* Technical Memorandum).

Information Sources

Reports, plans and data gathered included:

- Review of the Bath Feasibility Study Build Strategies.

Potential Implications of the Build Strategies on Opportunities for Economic Development

For the purposes of this study, two zones of distinct character have been identified: the *Commercial Zone*, the Route 1 corridor from Congress Avenue to the High Street Interchange in Bath; and, the *Downtown Zone*, the Route 1 corridor east of the High Street Interchange to the Sagadahoc Bridge.

Evaluation Matrix

In order to compare the advantages and disadvantages of the improvement options, the Study Team developed an Evaluation Matrix for discussion with the Steering Committee at its October 28, 2003 meeting. The Evaluation Matrix – Route 1 Options contains four primary categories of evaluation criteria associated with and inter-related with Economic Development. The most direct set of criteria are the 'Economic Vitality' measures. Three additional categories affect, although more indirectly, Economic Development: Community Visibility, Local Accessibility and

Property Impacts. In the public outreach for the project and through Steering Committee deliberations, the Community Visibility and Local Accessibility were continuously cited and linked to Economic Development. Property impacts relates to potential impacts to existing businesses but also to opportunities for future development or redevelopment. Each category contains four criteria.

Economic Vitality

The evaluation criteria for Economic Vitality are:

- Supports Bath as a destination (visibility and wayfinding)
- Preserves or improves accessibility to major employers, downtown and recreational destinations
- Has minimal impacts on adjacent businesses
- Creates opportunities for new development.

Community Visibility

The evaluation criteria for Community Visibility are:

- Maximizes intuitive wayfinding
- Promotes community identity
- Improves visibility of community resources before Route 1 exit points (especially northbound)
- Unobtrusive impact on community character and scale.

Local Accessibility

The evaluation criteria for Local Accessibility are:

- Connects Route 1 to waterfront
- Connects Route 1 to downtown Bath/historic district
- Provides appropriate access management
- Minimal impact on local street network.

Property Impacts

The evaluation criteria for Property Impacts are:

- Impacts to property minimized
- Minimizes displacements
- Avoids acquisition of historic/cultural properties
- Minimizes acquisition of viable businesses.

Commercial Zone ('C' Options and Access Management)

All of the design options in the Commercial Zone have the goal of re-orienting this section of the roadway to greatly improve the aesthetics and quality of the area which would make the area much more attractive to visitors. The designs also attempt to create a gateway effect (signal to drivers a change in character from interstate highway to urban/city street) through landscaping, signage and roadway design details to slow traffic to the speed limit (currently 35 mph). Each creates an improved character for the area through their incorporation of a five foot planting buffer or esplanade in the roadway cross-section between the roadway and sidewalk. Street trees would also be introduced into the streetscape. Option C-2 has a planted median between the north bound and south bound lanes to further enhance the character of the area.

Options C-3A, through its grade-separated, depressed roadway section, has the potential for higher property impacts on adjacent properties because of its larger potential project footprint (width of right of way required). Because of the depressed or below grade design for through traffic, community visibility is significantly reduced.

The Access Management Option additionally contributes to the goals in the zone by improving the safety, mobility, and attractiveness of the area.

Table 1 below rates each of the options for the number of criteria (out of four, described above) that the option meets. Higher scores are more positive for economic development.

Table 1
Economic Development Related Ratings
Commercial Zone ('C' Options and Access Management)

Option	Economic Vitality	Community Visibility	Local Accessibility	Property Impacts
Option C-1	2	0	4	4
Option C-2	3	3	3	1
Option C-3A	2	0	3	1
Access Mgt	1	0	4	3

Ratings presume each evaluation criteria is of equal importance.

Downtown Zone ('D' Options).

The Build Options in the Downtown Zone have their largest differences in terms of Local Accessibility and Community Visibility. All options have similar Property Impacts (assuming the rail alignment remains the same). An important aspect of Local Accessibility is where the 'decision point' to exit Route 1 for the downtown is located. A decision point that is closer to the intended destination is better, in general, than a decision point farther away from the downtown. Community Visibility is, in general, improved by an option that has through traffic at-grade.

Option D-1, the Elevated Viaduct Option, provides additional access to the downtown and Bath Iron Works via the new elevated off-ramp that connects to an extension of Commercial Street. The decision point to exit Route 1 Northbound moves closer to the downtown. Community Visibility remains low due to the traffic being elevated above grade.

Option D-2, the At-Grade Option, combines Route 1 through traffic with local traffic and creates at-grade intersections with major cross streets at Middle and Washington Streets. These two intersections are signalized. Decision points for downtown destinations are greatly improved. There are potentially large impacts on the local street network due to the mixing of through and local traffic.

Option D-3, the Depressed Route 1 Option, separates through and local traffic, as is currently done today but through a different design. Through traffic is accommodated below grade and therefore Community Visibility for this traffic is poor. The Middle Street connection across Route

1 is severed. The decision point to exit northbound is moved closer to downtown to near Middle Street.

Option D-4, the Modified At-Grade Option, places Route 1 through traffic at-grade but grade separates cross streets at Middle and Washington Streets. This configuration allows the decision point to access downtown to move closer to downtown and substantially increases Community Visibility. The required overpasses potentially limit accessibility to some properties near Route 1.

Option D-5, the Modified Depressed Option, provides downtown access directly to an extension of Commercial Street near Bath Iron Works via a below grade exit. Community Visibility is not enhanced.

The various options have distinct advantages and disadvantages in terms of the amount of potential Economic Development benefits.

Table 2 below rates each of the options for the number of criteria (out of four, described above) that the option meets. Higher scores are considered more positive for economic development.

Table 2
Economic Development Related Ratings
Downtown Zone ('D' Options)

Option	**Economic Vitality**	**Community Visibility**	**Local Accessibility**	**Property Impacts**
Option D-1	3	0	4	1
Option D-2	3	2	3	1
Option D-3	3	0	3	1
Option D-4	2	3	2	1
Option D-5	2	1	4	1

Ratings presume each evaluation criteria is of equal importance.

Compendium of Transportation and Engineering Technical Memoranda

Wilbur Smith Associates

ENGINEERS
PLANNERS
ECONOMISTS

May 26, 2004

TECHNICAL MEMO

TO: File

FROM: Phil DeLeon, P.E.
Tom Errico, P.E.

SUBJECT: MaineDOT
Bath Feasibility Study
MaineDOT PIN # 10123.00
Access Management: Existing Conditions

Methodology

Information on existing driveway openings within the Route 1 corridor from Congress Avenue to High Street was obtained by field review and measurement. The driveway inventory included driveway location, turn restrictions, land use, number of driveways per land use, driveway spacing, distance from nearby intersections, and traffic control. In addition, secondary data sources were consulted, including previous reports and studies.

Information Sources

Sources of data included
- City of Bath Zoning Ordinances, 2003
- City of Bath Aerial Mapping.

Baseline Information

Between Congress Avenue and High Street, Route 1 is a four lane divided highway. The division between the northbound and southbound lanes is a guard rail with a fence. The uses along the corridor are primarily commercial but also include a single family home and a multi-family residential building.

Southbound on Route 1 from High Street includes the addition of a second lane created from the Washington Street on ramp. Continuing southbound are the following land uses and number of driveways:
- Multi-family residential parking lot – one drive on Route 1 and one drive on Court Street
- Burger King restaurant – one drive on Route 1 and one drive on Court Street
- Office building (previously TMA Corp.) – two drives on Route 1 and one drive on Court Street
- M.W. Sewall Texaco and Car Wash – two drives on Route 1 and exit only from car wash on Court Street
- Single family residence – one drive on Route 1
- Car Quest Auto Parts – two drives on Route 1 and one drive on Court Street Extension

- Commercial site (2-bay car wash, Dunkin Donuts, Citgo gas station, convenience store, Reno's auto repair and sales – four drives on Route 1 and one drive on Court Street and Court Street Ext.
- Bath Shopping Center – entrance and exit (right turn in, right turn out only) on Route 1.

The shopping center drive connects to Court Street and Congress Avenue. Within the shopping center are McDonalds, Shaws Supermarket, CVS, Peoples Bank, Olympia Sports, Goodwill, Oriental Restaurant and several other businesses.

Northbound on Route 1 from Congress Avenue to High Street there are a number of side streets, including the exit and on ramp for State Road (Brunswick Road), Western Avenue, Quimby Street, Elsinore Avenue, and Cottage Street.

Land uses and driveways for parcels fronting Route 1 include:
- Former Bodwell auto dealership – two drives on Route 1 and two drives on Western Avenue
- Big Apple/Mobil – two drives on Route 1and one drive on Quimby Street
- Cumberland Farms – two drives on Route 1 and one drive on Cottage Street
- Bert's Exxon – two drives on Route 1 and one drive on the off ramp to High Street. Bert's Exxon also provides parking for local school buses and parking for trucks that provide home heating oil deliveries.

Within this portion of Route 1, there is no cross-Route 1 access connecting the north and south sides of Route 1. North-south access is provided at Congress Avenue and at High Street.

Results of Inventory

Figure 1 depicts the land uses and the locations and dimensions of the driveways on Route 1 identified above.

BATH FEASIBILITY STUDY

ACCESS MANAGEMENT: EXISTING

100' 0 100' 200'

Page 3 of 3

Wilbur Smith Associates

ENGINEERS PLANNERS ECONOMISTS

May 26, 2004

TECHNICAL MEMO

TO: File

FROM: Phil DeLeon, P.E.
Tom Errico, P.E.

SUBJECT: MaineDOT
Bath Feasibility Study
MaineDOT PIN # 10123.00
Access Management: Potential Strategies

Information Sources

Reference material includes the Maine Department of Transportation Access Management Guidelines.

Potential Access Management Strategies

Access management along the corridor can be approached in a variety of manners. A more limited, conservative approach minimizes the changes to correct the most serious safety issues while a more comprehensive or aggressive approach can be adopted to maximize the overall efficiency and safety of the roadway.

For Route1 between Congress Avenue and High Street, a range of potential access management strategies was identified (see Figure 1, page 3). These illustrated strategies demonstrate a "middle of the road approach" (between conservative and aggressive described above) to the types of actions that can improve the safety and operation for users of Route 1. They accomplish this while still providing reasonable and adequate access for property and business owners. The access management strategies also complement other roadway upgrade strategies to improve the appearance of the area and improve pedestrian safety.

Southbound Side of Route 1: East to West from High Street. The following are the potential access management strategies that have been identified for the land uses along Route 1.

- Multi-family parking lot – close drive at on-ramp and use drive on Court Street.
- Burger King restaurant – Relocate drive to the west to share with adjacent lot to increase separation from the on ramp from High Street.
- Office building (previously TMA Corp.) – Close the westerly drive and combine with a relocated easterly drive with Burger King.
- M.W. Sewall Texaco and Car Wash – Both drives to remain. Emphasize driveway to Court Street (remains).
- Single family residence – Relocate and combine drive with adjacent Car Quest lot.
- Car Quest Auto Parts – Close westerly drive and combine the easterly drive with the adjacent home in a new location.
- Commercial site (2-bay car wash, Dunkin Donuts, Citgo gas station, convenience store, Reno's auto repair and sales – Close three of the four drives. The existing

drive at the Dunkin Donuts drive-thru will remain. Emphasize entrance/exit off Court Street.

- Bath Shopping Center – Entrance and exit to remain.

Northbound Side of Route 1: West to East. The following are the potential access management strategies that have been identified for the land uses along Route 1.

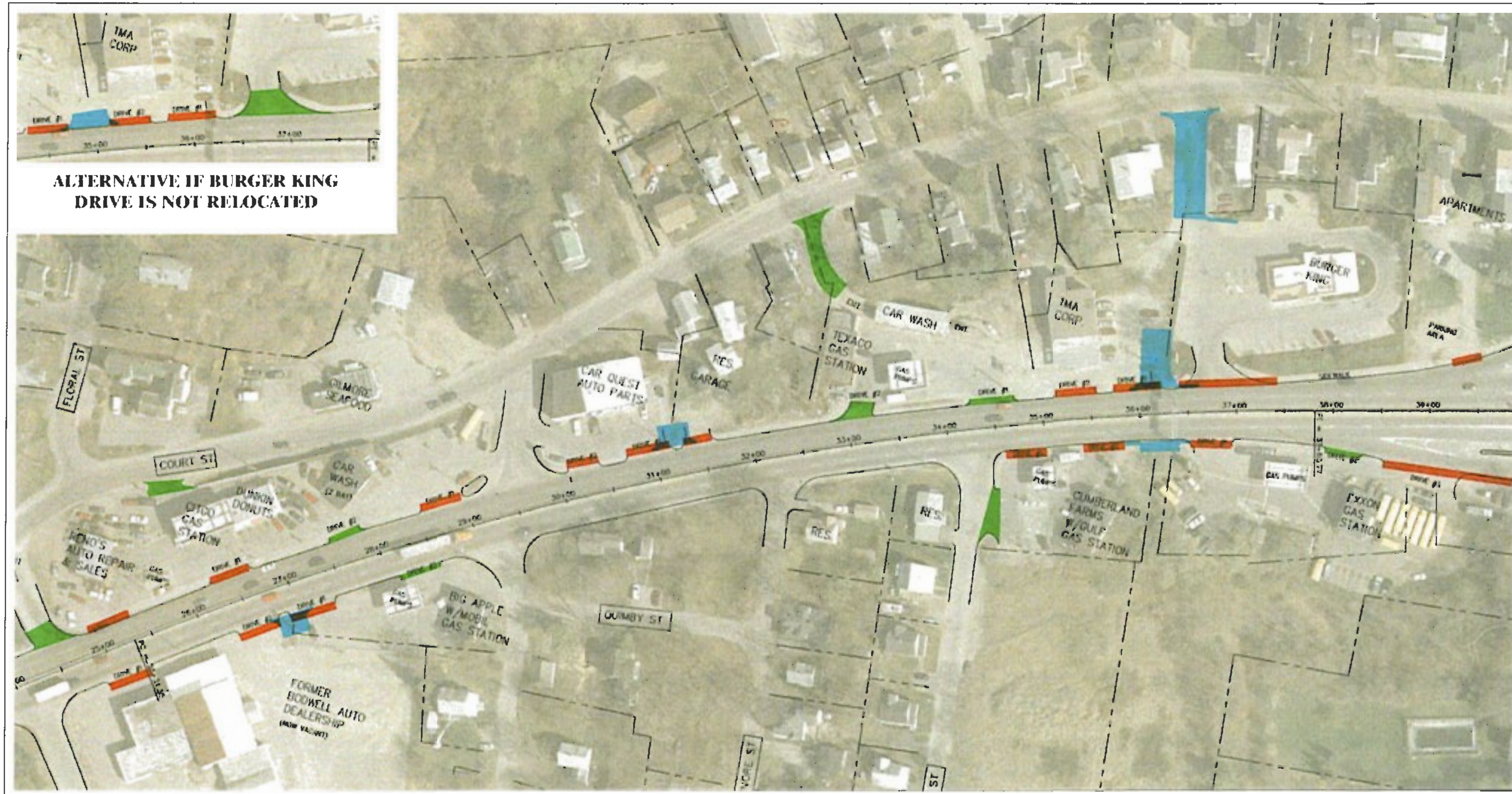
- Former Bodwell auto dealership – Close westerly drive and relocate the easterly drive to combine with the adjacent Big Apple site.
- Big Apple/Mobil – Relocate the westerly drive to combine with the Bodwell site and maintain the easterly drive.
- Cumberland Farms – Close the westerly drive and relocate the easterly drive to combine with Bert's Exxon.
- Bert's Exxon – Relocate the westerly drive to combine with the Cumberland Farm site and maintain the center drive and close the easterly drive on the High Street off-ramp.

Figure 1 depicts the potential strategies, which include:

- maintaining existing drives,
- closing driveways,
- consolidating access with an adjacent parcel or
- relocating/reconfiguring a driveway within a parcel.

The depicted potential strategies are *not* to be construed as specific recommendations for Route 1. They are intended to illustrate the application of a comprehensive, but middle of the road, access management strategy. To achieve success at access management programs, it is essential to include property owners and business owners very early in the planning and design process. It is important to sit down with each land owner to discuss specific access needs and operational requirements for each existing or potential future business use.

It should be noted that there are also further opportunities for additional access management strategies to complement possible redevelopment of parcels along the southbound side of Route 1 that also front Court Street.



BATH FEASIBILITY STUDY

ACCESS MANAGEMENT: POTENTIAL STRATEGIES

BATH
City of Ships

DEPARTMENT OF TRANSPORTATION

HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005 **Date:** March 30, 2004

From: Paul Godfrey

Subject: Maine DOT - Bath Feasibility Study
MDOT PIN # 10123.00
Base Case Traffic Conditions – Operational Analysis

Introduction

This Technical Memorandum describes the methodologies and results of the operational analysis performed for the Study Area roads under existing (2002) traffic conditions. The procedures employed in this analysis are those contained in the Transportation Research Board's *Highway Capacity Manual 2000* (National Research Council, 2000). The traffic analysis is separated into three functional groups: intersections (both signalized and unsignalized), road segments, and ramps. The intersection analysis was performed by *SimTraffic*, a micro-simulation tool that employs the procedures of the Highway Capacity Manual (HCM). The road segments and ramps were analyzed with the *Highway Capacity Software 2000* (HCS2000), a software tool that also applies the procedures of the HCM.

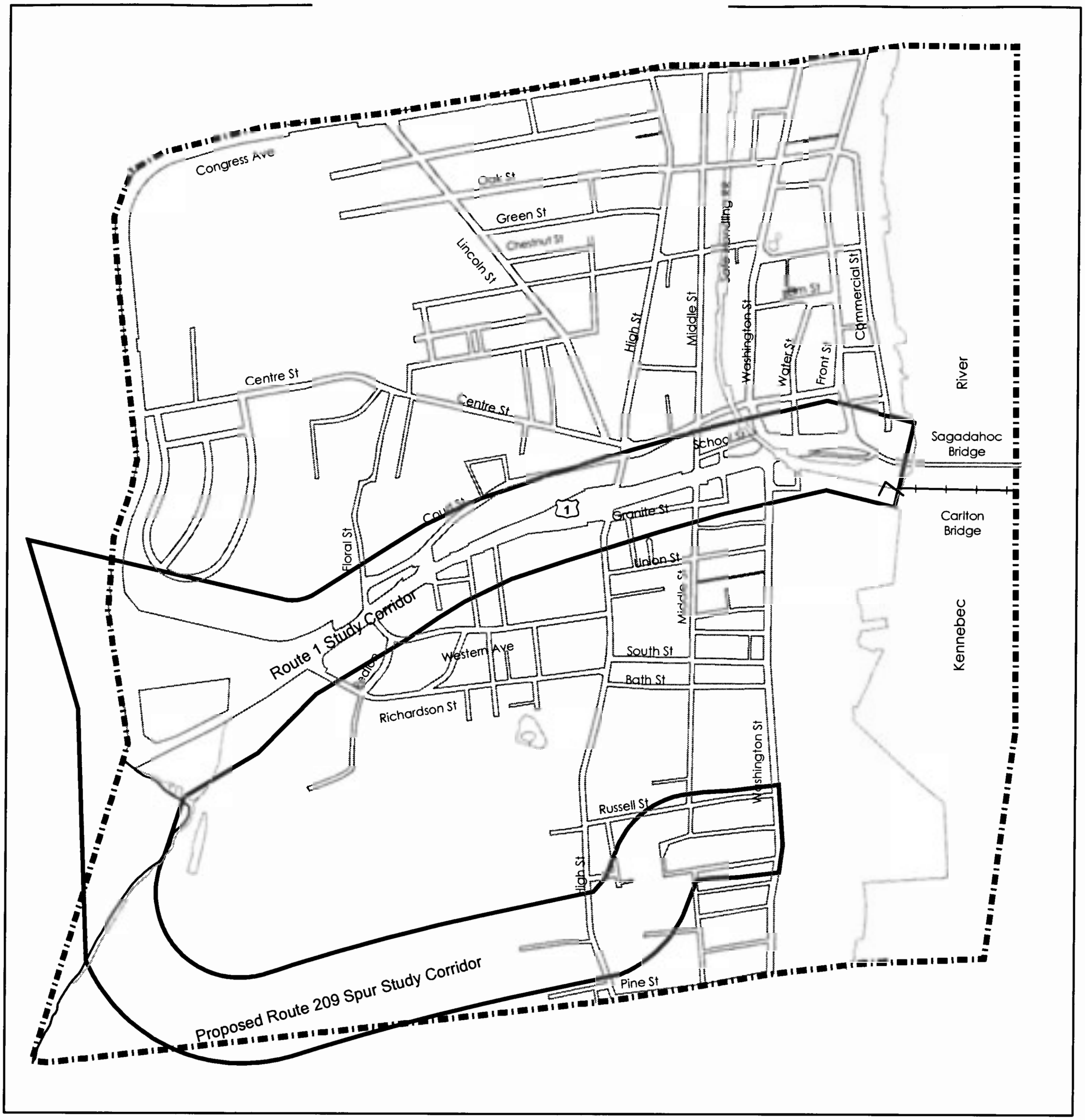
Standard traffic engineering practice encapsulates the various characteristics of traffic flow in terms of a parameter known as Level of Service (LOS). This parameter—which measures the composite effects of speed, traffic interruption, comfort, freedom to maneuver, and convenience—provides a basis for comparing various facilities to one another. Six levels of service, expressed by letter designations from A to F, are defined for each type of highway facility.

Although specific characteristics of flow vary by the type of facility in question, LOS A generally represents free-flow conditions where the quality of flow experienced by the motorist is excellent. LOS F defines forced or breakdown flow where the quality of flow experienced by the motorist is poor, drivers are faced with prolonged stop-and-go conditions, and blockages occur, often preventing traffic movement on cross streets. The practical traffic-carrying capacity of a facility is approached and attained at LOS E. Operations at this level are usually unstable, as small increases or minor disturbances in flow will cause a breakdown in operation.

For each type of facility, the HCM defines LOS based on one or more operational parameters (such as delay and density) which best describe the quality of the facility's operations. Such operations are evaluated during the "design condition", which typically consists of two hours each day (one in the morning peak, the other in the evening peak). Each LOS represents a range of operating conditions; it is not a single, distinct condition.

Functional Groups

Signalized Intersections. A signalized intersection is one of the most complex locations in the traffic system. To understand the operation of a signalized intersection, it is important to understand the two parameters that are paramount to this operation: capacity and delay.



Study Corridor

Roadways

Study Area

Bath Feasibility Study
Study Area

Maine DOT PIN 10123.00

Feet
0 250 500 1,000 1,500 2,000

Capacity at a signalized intersection is defined for each approach. Intersection approach capacity is the maximum rate of flow which can pass through the intersection as a function of given traffic volumes, road geometry, and signalization parameters. It is expressed in terms of a volume-to-capacity (or “v/c”) ratio, which relates the traffic *volume* at each approach to the actual *capacity* of the approach. The v/c ratios may vary between 0 (no traffic on the approach) and 1.00 (traffic flow equals capacity). If the v/c ratio exceeds 1.00, the approach demand volume is greater than capacity and not all of the demand can be serviced during a given period of time. Accordingly, residual queues build up on the approach and additional time is required to process traffic through the intersection. The peak period extends to a duration longer than would be expected under uncongested conditions.

Delay at signalized intersections represents the difference between the *actual* travel time and the time it would have taken to clear the network in the absence of any signals or other vehicles. In other words, it measures delays associated with slowing down, moving through the queue, stopping, and restarting. Delay is dependent on a number of variables, including the quality of traffic signal progression, signal cycle length, allocation of green time to a particular movement, and the v/c ratio for the approach under consideration. The Level of Service (LOS) of a particular approach is based on the average delay experienced by vehicles on that approach as they pass through the intersection. The HCM defines LOS A through LOS F as follows:

LOS A describes operations with delays of <u>up to 10 seconds per vehicle</u> (sec/veh). It occurs when traffic signal progression is extremely favorable, and most vehicles arrive at the intersection during the green phase. Many vehicles do not stop at all.

LOS B describes operations with delays of <u>greater than 10 and up to 20 sec/veh</u>. It generally occurs with good progression and/or short cycle length. More vehicles have to stop, thus increasing the average delay.

LOS C occurs when delays are <u>greater than 20 up to 35 sec/veh</u>. It results from fair progression and/or longer cycle lengths. Individual cycle failures (that is, some vehicles end up stopping twice at the intersection) may begin to appear. The number of vehicles stopping is greater than for LOS B, although some still pass through the intersection without stopping.

LOS D occurs when delays are <u>greater than 35 up to 55 sec/veh</u>. At this stage, congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Cycle failures become more common.

LOS E occurs when delays are <u>greater than 55 up to 80 sec/veh</u>. These high delays typically indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences. Traffic conditions are very unstable at this point.

LOS F describes operations where average delays <u>exceed 80 sec/veh</u>. It is considered to be a forced-flow, congested condition. This condition often occurs with oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

The criteria for equating average vehicle delay to LOS is given in Table 1. Each movement within an intersection will have an LOS rating (e.g. "the northbound left-turn movement operates at LOS B"), and the intersection as a whole will have an LOS rating (e.g. "the intersection of Routes 114 and 25 operates at LOS D"). The intersection LOS is essentially a weighted average of the individual movements' levels of service.

Table 1: LOS Criteria for Signalized Intersections

Level of Service	Measure of Effectiveness (signalized)
	Average Delay (seconds)
A	<= 10
B	>10 & <=20
C	>20 & <=35
D	>35 & <=55
E	>55 & <=80
F	>80

Typically, LOS C is considered a design standard by the American Association of State Highway and Transportation Officials (AASHTO). This may not be practical on existing urban streets, where physical obstructions and right-of-way limitations do not allow for sufficient geometry. AASHTO and Maine DOT consider LOS D an acceptable standard in many urban conditions. Furthermore, if a highway facility operates at LOS D during the peak hours, it is likely that it operates at LOS C or better for most of the day.

The relationship between the intersection capacity and the delay is very complex. For example, it is possible to have delays in the range of LOS F while the v/c ratio is below 1.00. This situation would mean that while there is enough capacity to service the demand, unacceptably long delays still occur due to long cycle lengths, poor signal progression, or allocation of insufficient amount of green time to a particular movement. The reverse is also possible: an approach with demand volumes equal to the approach capacity (v/c = 1.00) may have acceptable delays due to short cycle length or a favorable signal progression for a particular movement. Thus, both capacity and LOS have to be analyzed to fully evaluate the operation of a signalized intersection.

Results of the existing (2002) base conditions traffic analysis performed for the signalized intersections in the Study Area are summarized in Appendix A, page A-1.

Unsignalized Intersections. Although v/c ratios are considered in unsignalized analysis, the primary measuring tool used to evaluate performance is *delay.* The unsignalized intersection analysis measures delay in the same manner as the signalized intersection analysis; that is, it measures the difference between the actual travel time experienced by motorists and the time it would have taken them had no signs (e.g. STOP or YIELD signs) or other vehicles been present. At two-way stop-controlled (TWSC) intersections, the greatest delays are experienced by vehicles on the stop-controlled (or "minor") approaches. However, vehicles on the non-stop controlled (or "major") approaches also experience delays. For example, vehicles on the major approaches seeking to turn left onto minor roadway can experience delays as they wait for gaps in opposing traffic. Moreover, "thru" traffic on the major approaches can be delayed if they get behind the aforementioned left-turning vehicles waiting for gaps.

The LOS thresholds for average delay are lower for unsignalized intersections than they are for signalized intersections. This is because people *expect* to face higher delays at signalized intersections, given that signalized intersections generally carry higher traffic volumes. Table 2 illustrates these LOS criteria for unsignalized intersections.

Table 2: LOS Criteria for Unsignalized Intersections

Level of Service	Measure of Effectiveness (unsignalized)
	Average Delay (seconds)
A	<= 10
B	>10 & <=15
C	>15 & <=25
D	>25 & <=35
E	>35 & <=50
F	>50

Results of the existing (2002) base conditions traffic analysis performed for the unsignalized intersections in the Study Area are summarized in Appendix A, pages A2-A5.

Two-Lane Roadways. Level of Service criteria for segments of two-lane roadways consider a complex set of parameters including traffic volume, traffic composition, directional distribution, operating speed, terrain, and percentage of no-passing zones. In some instances, certain levels of service cannot be achieved due to prevailing physical considerations, irrespective of the volume of traffic present on the highway. Therefore, it is important to consider not only LOS, but also the volume-to-capacity (v/c) ratio in describing operations on a two-lane highway.

The HCM divides two-lane highways into two classes. *Class I* highways are roads on which travelers expect to travel at relatively high speeds. Such roads would include major intercity routes and daily commuter routes. *Class II* highways are roads on which travelers do not expect to travel at high speeds. These would include roads that provide access to Class I routes, as well as some scenic or recreational routes. While more appropriate for rural roadways, this methodology is applied to Bath Study area roadways to assess operation.

The vast majority of two-lane roadways in the Bath Study Area are Class II roadways.

The LOS of a Class II roadway is based on a parameter call "percent time-spent-following", or %TSF. This parameter measures the average percentage of time that vehicles must travel in platoons behind slower vehicles, due to the lack of opportunity to pass. Table 3, page 6 of 8 illustrates the LOS criteria for two-lane roadways.

Table 3: LOS Criteria for Two-Lane Roadways

Level of Service	Measure of Effectiveness (two-lane roadways)
	Percent Time-Spent-Following
A	<= 40
B	>40 & <=55
C	>55 & <=70
D	>70 & <=85
E	>85
F	Demand Exceeds Capacity

The HCM does not define a criterion for LOS F. This is because LOS F is defined in terms of volume-to-capacity (v/c) ratio, not in terms of %TSF. If the volume of a two-lane roadway exceeds its capacity (that is, if v/c > 1.00), then it is said to operate at LOS F. Experience has shown that the practical capacity of a two-lane roadway is 1,700 passenger cars per hour (pcph) in one direction only, or 3,200 pcph for both directions of travel combined.

Results of the existing (2002) base conditions traffic analysis performed for the two-lane roadways in the Study Area are summarized in Appendix A, page A-6, A-7.

Multi-Lane Highways. The HCM defines multi-lane highways as generally four or six-lane facilities, in both directions, that can be either divided or undivided. Most notably, multi-lane highways are not completely access controlled, they can have at-grade intersections and occasional traffic signals

The LOS of a multi-lane highway is primarily defined by density (in terms of passenger cars per mile per lane). However, speed, density, and traffic flow or volume are interrelated and are factors in determining LOS. Each of these measures indicate how well the highway accommodates traffic flow.

Table 4 summarizes the LOS criteria for multi-lane highways under varying design speeds. Design speeds generally correspond to the 85th percentile speed.

Table 4: LOS Criteria for Multi-Lane Highways

Level of Service	Measure of Effectiveness for Multi-Lane Highways			
	Density (passenger cars per mile per lane)			
	60 mph	55 mph	50 mph	45 mph
A	11	11	11	11
B	18	18	18	18
C	26	26	26	26
D	35	35	35	35
E	40	41	43	45
F	>40	>41	>43	>45

Results of the existing (2002) base conditions traffic analysis performed for the multi-lane highways in the Study Area are summarized in Appendix A, page A-8.

Ramps. The HCM provides guidelines for the analysis of both entry (or "merge") ramps and exit (or "diverge") ramps. The analysis takes into account several factors, including the volume of mainline traffic, the volume of ramp traffic, the length of the merge (or diverge) area, the percentage of trucks, and the speed of traffic in the vicinity of the ramp.

The LOS of a ramp section is defined by density (in terms of passenger cars per mile per lane) in the designated "influence area". For entry ramps, the influence area begins at the point at which the ramp merges onto the mainline, and extends 1500 feet downstream. For exit ramps, the influence area begins 1500 feet upstream of the ramp and extends to the point at which the ramp diverges from the mainline.

Table 5 summarizes the LOS criteria for merge and diverge ramp sections. As with two-lane roadways, LOS F is not defined in terms of the designated "measure of effectiveness"; rather, it is defined by the condition in which the volume of traffic exceeds the capacity of the facility.

Table 5: LOS Criteria for Merge and Diverge Areas

Level of Service	**Measure of Effectiveness (Ramps)**
	Density (passenger cars per mile per lane)
A	<= 10
B	>10 & <=20
C	>20 & <=28
D	>28 & <=35
E	>35
F	Demand exceeds capacity

Results of the existing (2002) base conditions traffic analysis performed for the ramps (merge and diverge areas) in the Study Area are summarized in Appendix A.

Appendix A – Traffic Analysis Summaries

Bath Feasibility Study

Signalized Intersection Level-of-Service Summary

Intersection	Movement	2002 PM Peak Volumes DHV	2002 PM Peak Volumes Output	2002 PM Peak Delay	2002 PM Peak LOS	2002 AM Peak Volumes DHV	2002 AM Peak Delay	2002 AM Peak LOS
Washington@Centre	Washington St. NB-L	156	140	19.2	B	89	17.3	B
	Washington St. NB-T	103	97	21.3	C	93	19.1	B
	Washington St. NB-R	98	97	5.5	A	67	4.5	A
	Washington St. SB-L	29	25	84.4	F	10	42.6	D
	Washington St. SB-T	145	156	90.0	F	75	43.0	D
	Washington St. SB-R	62	55	69.4	E	25	21.9	C
	Centre St. EB-L	14	10	42.4	D	9	16.3	B
	Centre St. EB-T	197	193	28.1	C	77	18.8	B
	Centre St. EB-R	140	133	22.8	C	70	10.5	B
	Centre St. WB-T	214	203	19.2	B	49	16.9	B
	Centre St. WB-R	14	12	11.2	B	5	14.6	B
	Intersection	**1173**	**1121**	**34.0**	**C**	**569**	**19.7**	**B**
Washington@Leeman Hwy	Washington St. NB-L	188	145	623.4	F	55	56.4	E
	Washington St. NB-T	69	55	582.8	F	42	52.0	D
	Washington St. NB-R	264	236	574.4	F	70	7.8	A
	Washington St. SB-L	199	190	105.3	F	76	47.5	D
	Washington St. SB-T	202	208	113.5	F	108	41.9	D
	Washington St. SB-R	47	50	33.0	C	40	4.6	A
	Leeman Hwy EB-L	163	162	51.3	D	104	38.2	D
	Leeman Hwy EB-T	135	141	48.7	D	98	35.8	D
	Leeman Hwy EB-R	176	157	11.2	B	130	5.2	A
	Leeman Hwy WB-L	149	159	52.1	D	88	35.7	D
	Leeman Hwy WB-T	100	115	49.7	D	46	31.8	C
	Leeman Hwy WB-R	124	113	2.1	A	103	1.3	A
	Intersection	**1816**	**1731**	**193.2**	**F**	**959**	**28.3**	**C**

Signalized Level-of-Service (LOS) Criteria

Average Delay	LOS
less than 10s	A
>10s and <=20s	B
>20s and <=35s	C
>35s and <=55s	D
>55s and <=80s	E
>80s	F

Bath Feasibility Study

Unsignalized Intersection Level-of-Service Summary

Intersection	Movement	2002 PM Peak DHV	2002 PM Peak Delay	2002 PM Peak LOS	2002 AM Peak DHV	2002 AM Peak Delay	2002 AM Peak LOS
Congress@Shop	Congress NB-T	356	3.0	A	238	1.8	A
	Congress NB-R	169	4.9	A	83	4.8	A
	Congress SB-L	106	7.8	A	43	3.5	A
	Congress SB-T	407	2.6	A	319	0.6	A
	Shop WB-L	147	42.7	E	71	8.5	A
	Shop WB-R	127	43.6	E	40	4.2	A
	Intersection	**1312**	**11.7**	**B**	**795**	**2.5**	**A**
Congress@Leeman Hwy	Congress SB-L	180	141.2	F	100	7.1	A
	Congress SB-R	184	61.2	F	128	4.2	A
	Leeman Hwy EB-L	216	10.9	B	123	2.4	A
	Leeman Hwy EB-T	295	7.0	A	163	1.8	A
	Leeman Hwy WB-T	227	2.8	A	94	0.7	A
	Leeman Hwy WB-R	342	2.9	A	173	1.3	A
	Intersection	**1444**	**26.8**	**D**	**780**	**2.6**	**A**
High@Centre	High St. NB-L	76	13.9	B	77	5.8	A
	High St. NB-T	112	10.3	B	63	7.0	A
	High St. NB-R	1	7.5	A	2	3.9	A
	High St. SB-L	17	12.2	B	10	5.3	A
	High St. SB-T	107	13.1	B	65	6.5	A
	High St. SB-R	7	5.1	A	9	2.3	A
	Centre St. EB-L	7	15.4	C	8	5.7	A
	Centre St. EB-T	107	16.3	C	60	7.6	A
	Centre St. EB-R	111	13.2	B	84	4.4	A
	Centre St. WB-L	228	2.5	A	68	2.1	A
	Centre St. WB-T	182	1.9	A	56	1.0	A
	Centre St. WB-R	22	4.7	A	8	3.7	A
	Intersection	**978**	**8.6**	**A**	**508**	**5.0**	**A**
High@Court	High St. NB-L	40	12.0	B	24	5.1	A
	High St. NB-T	152	8.8	A	125	6.6	A
	High St. NB-R	109	6.4	A	36	3.5	A
	High St. SB-L	8	1.8	A	2	0.4	A
	High St. SB-T	338	1.3	A	171	1.1	A
	High St. SB-R	100	2.9	A	44	2.4	A
	Court St. EB-L	36	11.4	B	16	4.6	A
	Court St. EB-T	108	13.0	B	63	5.6	A
	Court St. EB-R	136	9.0	A	33	3.1	A
	Intersection	**1029**	**6.2**	**A**	**514**	**3.6**	**A**
High@WBRamp	High St. NB-L	381	7.9	A	219	3.4	A
	High St. NB-T	302	6.0	A	185	1.9	A
	High St. SB-T	372	1.7	A	149	1.0	A
	High St. SB-R	102	4.2	A	54	4.5	A
	Intersection	**1157**	**4.9**	**A**	**608**	**2.5**	**A**

Bath Feasibility Study

Unsignalized Intersection Level-of-Service Summary

Intersection	Movement	2002 PM Peak DHV	2002 PM Peak Delay	2002 PM Peak LOS	2002 AM Peak DHV	2002 AM Peak Delay	2002 AM Peak LOS
EB_Ramp@High	High St. NB-T	576	1.7	A	334	0.6	A
	High St. NB-R	10	3.8	A	11	3.8	A
	High St. SB-L	36	4.3	A	13	3.5	A
	High St. SB-T	336	1.3	A	136	0.6	A
	Ramp EB-L	94	73.4	F	69	8.1	A
	Ramp EB-T	4	82.6	F	2	17.0	C
	Ramp EB-R	201	6.3	A	79	3.4	A
	Granite WB-L	5	1.6	A	1	0.0	A
	Granite WB-R	13	35.1	E	3	3.8	A
	Intersection	**1275**	**8.3**	**A**	**647**	**1.9**	**A**
Middle@Centre	Middle St. NB-L	29	13.0	B	3	3.8	A
	Middle St. NB-T	66	14.7	B	24	6.0	A
	Middle St. NB-R	47	7.7	A	12	2.5	A
	Middle St. SB-L	23	19.9	C	4	3.6	A
	Middle St. SB-T	36	15.6	C	30	6.3	A
	Middle St. SB-R	39	8.3	A	11	2.3	A
	Centre EB-L	40	5.1	A	19	2.4	A
	Centre EB-T	282	1.5	A	140	0.6	A
	Centre EB-R	29	3.8	A	14	4.8	A
	Centre WB-L	42	5.5	A	25	3.4	A
	Centre WB-T	365	2.6	A	117	1.5	A
	Centre WB-R	24	5.8	A	20	5.2	A
	Intersection	**1021**	**4.7**	**A**	**419**	**2.3**	**A**
Leeman Hwy@Middle	Middle St. NB-L	97	10.6	B	15	10.7	B
	Middle St. NB-T	45	9.8	A	38	8.3	A
	Middle St. NB-R	38	5.0	A	8	2.6	A
	Middle St. SB-L	38	17.5	C	19	10.1	B
	Middle St. SB-T	20	15.0	C	24	9.0	A
	Middle St. SB-R	117	7.5	A	25	3.5	A
	Leeman Hwy EB-L	38	5.8	A	38	5.2	A
	Leeman Hwy EB-T	291	1.4	A	292	0.8	A
	Leeman Hwy EB-R	15	4.6	A	10	4.4	A
	Leeman Hwy WB-L	5	2.9	A	10	5.4	A
	Leeman Hwy WB-T	439	1.1	A	133	0.3	A
	Leeman Hwy WB-R	3	3.7	A	6	3.6	A
	Intersection	**1143**	**4.1**	**A**	**616**	**2.7**	**A**
Front@Centre	Front St. NB-L	95	6.0	A	38	5.2	A
	Front St. NB-T	182	7.1	A	110	3.8	A
	Centre St. EB-L	117	4.5	A	71	4.2	A
	Centre St. EB-R	43	1.5	A	25	5.4	A
	Intersection	**438**	**4.9**	**A**	**244**	**4.2**	**A**

Bath Feasibility Study

Unsignalized Intersection Level-of-Service Summary

		2002 PM Peak			2002 AM Peak		
Intersection	Movement	DHV	Delay	LOS	DHV	Delay	LOS
Vine@Front	Front St. SB-R	43	4.1	A	25	4.4	A
	Vine St. EB-L	91	1.7	A	91	1.7	A
	Vine St. WB-T	365	10.6	B	187	7.4	A
	Vine St. WB-R	186	7.1	A	148	4.5	A
	Intersection	**685**	**8.1**	**A**	**451**	**5.1**	**A**
Vine@Water	Water St. SB-L	4	38.1	E	3	9.2	A
	Water St. SB-R	150	20.3	C	54	3.2	A
	Vine St. WB-T	365	5.4	A	212	3.6	A
	Intersection	**519**	**9.8**	**A**	**269**	**3.6**	**A**
High@Pine	High St. NB-L	1	0.0	A	1	0.0	A
	High St. NB-T	303	0.6	A	322	1.7	A
	High St. NB-R	14	4.0	A	5	3.5	A
	High St. SB-L	84	3.6	A	17	4.5	A
	High St. SB-T	403	1.7	A	153	2.3	A
	High St. SB-R	6	5.0	A	1	0.0	A
	Tarbox Ln EB-L	8	10.3	B	8	4.2	A
	Tarbox Ln EB-T	1	2.3	A	1	0.0	A
	Tarbox Ln EB-R	4	2.9	A	1	1.2	A
	Pine WB-L	5	7.2	A	3	4.9	A
	Pine WB-T	0	0.0	A	0	0.0	A
	Pine WB-R	134	4.1	A	31	3.5	A
	Intersection	**963**	**2.0**	**A**	**544**	**2.2**	**A**
Middle@Pine	Middle St. NB-L	2	0.0	A	5	3.2	A
	Middle St. NB-T	5	6.9	A	0	0.0	A
	Middle St. NB-R	6	3.6	A	0	0.0	A
	Middle St. SB-L	2	3.9	A	1	0.0	A
	Middle St. SB-T	3	4.5	A	0	0.0	A
	Middle St. SB-R	56	2.7	A	11	1.8	A
	Pine Ln EB-L	34	2.2	A	12	2.2	A
	Pine Ln EB-T	64	0.4	A	12	0.1	A
	Pine Ln EB-R	1	5.2	A	0	0.0	A
	Pine WB-L	5	2.6	A	0	0.0	A
	Pine WB-T	81	0.5	A	18	0.4	A
	Pine WB-R	2	5.0	A	0	0.0	A
	Intersection	**260**	**1.5**	**A**	**60**	**1.3**	**A**
Washington@Pine	Washington St. NB-L	7	6.6	A	7	2.5	A
	Washington St. NB-T	129	1.5	A	96	0.4	A
	Washington St. SB-T	147	2.6	A	72	0.3	A
	Washington St. SB-R	81	4.8	A	11	4.9	A
	Pine Ln EB-L	68	5.2	A	9	4.0	A
	Pine Ln EB-R	4	2.9	A	4	2.9	A
	Intersection	**436**	**3.1**	**A**	**199**	**1.0**	**A**

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Unsignalized Intersection Level-of-Service Summary

Intersection	Movement	2002 PM Peak DHV	2002 PM Peak Delay	2002 PM Peak LOS	2002 AM Peak DHV	2002 AM Peak Delay	2002 AM Peak LOS
ShopCtr@US-1	Shopping Ctr SB-R	74	9.5	A	59	5.2	A
	US-1 WB-T	1859	8.8	A	1046	1.5	A
	US-1 WB-R	170	10.1	B	96	5.2	A
	Intersection	**2103**	**8.9**	**A**	**1201**	**2.1**	**A**
ShopCtr@Court	Shopping Ctr NB-T	167	0.5	A	89	0.4	A
	Shopping Ctr NB-R	4	1.0	A	7	1.0	A
	Shopping Ctr SB-L	264	0.6	A	91	0.4	A
	Shopping Ctr SB-T	54	0.4	A	36	0.3	A
	Court St. WB-L	20	4.8	A	23	2.6	A
	Court St. WB-R	145	2.0	A	67	1.3	A
	Intersection	**653**	**1.0**	**A**	**313**	**0.7**	**A**

Unsignalized Level-of-Service (LOS) Criteria

Average Delay	LOS
less than 10s	A
>10s and <=15s	B
>15s and <=25s	C
>25s and <=35s	D
>35s and <=50s	E
>50s	F

Bath Feasibility Study

2002 Roadway Analysis Summary

Location	Period	ATR Counts NB / EB	SB / WB	Total	Peak Volume	Directional Distribution	PHF	% Time Spent Following	V/C Ratio	LOS
Center St 75ft E of Middle ST	AM Peak	157	181	338	319	51%	0.90	48.1%	0.12	B
	PM Peak	415	334	748	782	55%	0.92	67.2%	0.27	C
Center St. just W of Middle St.	AM Peak	203	181	384	303	57%	0.89	56.0%	0.17	C
	PM Peak	354	342	696	783	55%	0.94	69.0%	0.30	C
Commercial St just N Lambard St	AM Peak	44	41	85	85	52%	0.86	29.0%	0.03	A
	PM Peak	55	107	161	161	66%	0.81	40.5%	0.07	B
Congress St. just S of Rt 1	AM Peak	338	250	588	523	56%	0.97	59.3%	0.18	C
	PM Peak	637	406	1,043	923	60%	0.86	72.8%	0.34	D
Court St just W of High ST	AM Peak	149	77	225	181	62%	0.75	42.8%	0.08	B
	PM Peak	282	122	404	421	67%	0.89	56.0%	0.16	C
High St just N of Union	AM Peak	290	404	694	560	62%	0.89	62.4%	0.20	C
	PM Peak	579	571	1,150	1,123	52%	0.82	78.3%	0.43	D
High St. just N of Center St.	AM Peak	103	99	202	163	52%	0.69	40.3%	0.08	B
	PM Peak	135	130	265	273	52%	0.90	45.0%	0.10	B
High St. just S of Pine St.	AM Peak	284	219	503	485	68%	0.79	61.8%	0.19	C
	PM Peak	348	453	801	730	56%	0.98	64.1%	0.24	C
High St. just S of Court St	AM Peak	186	225	411	389	52%	0.94	54.6%	0.14	B
	PM Peak	287	461	747	776	61%	0.91	66.8%	0.27	C
Leeman Hwy just W of Congress	AM Peak	300	243	543	507	56%	0.94	55.8%	0.18	C
	PM Peak	572	414	985	922	55%	0.88	70.2%	0.33	D
Leeman Hwy just W of Middle St - EB	AM Peak	503	0	503	340	100%	0.92	65.6%	0.23	C
	PM Peak	432	0	432	344	100%	0.88	65.9%	0.23	C
Leeman Hwy just W of Middle St - WB	AM Peak	0	186	186	172	100%	0.92	51.1%	0.16	B
	PM Peak	0	397	397	652	100%	0.88	81.1%	0.43	D
Middle St. S of School St	AM Peak	77	78	155	149	55%	0.87	36.2%	0.06	A
	PM Peak	76	200	276	259	67%	0.69	52.8%	0.12	B
Middle St. just S of Stacy St	AM Peak	18	29	46	46	62%	0.83	28.2%	0.02	A
	PM Peak	141	50	190	190	74%	0.53	46.4%	0.08	B
Middle St just N Pine ST	AM Peak	5	6	10	24	50%	0.64	24.3%	0.01	A
	PM Peak	11	19	30	102	59%	0.59	37.1%	0.06	A
EB RT 1 Viaduct at High St	AM Peak	455	763	1,218	1,218	63%	0.93	76.8%	0.41	D
	PM Peak	997	878	1,874	1,874	53%	0.96	86.7%	0.63	E
Vine St just E of Water St	AM Peak	51	448	499	281	75%	0.93	56.1%	0.15	C
	PM Peak	117	417	533	456	80%	0.86	65.0%	0.19	C
Washington St. just N of Center St	AM Peak	132	137	269	217	51%	0.87	47.4%	0.12	B
	PM Peak	180	218	398	368	64%	0.93	59.4%	0.14	C
Washington St. just N of King St	AM Peak	182	780	962	493	66%	0.89	60.0%	0.18	C
	PM Peak	444	527	970	1,048	50%	0.82	76.9%	0.40	D
Washington St just S of Pine St.	AM Peak	103	83	186	179	58%	0.87	44.1%	0.10	B
	PM Peak	147	157	304	288	53%	0.89	54.6%	0.16	B
Washington St. just S. of Center St	AM Peak	102	108	210	393	63%	0.93	53.5%	0.14	B
	PM Peak	144	174	318	642	56%	0.91	63.9%	0.22	C
Water St just N of King St	AM Peak	23	27	49	41	76%	0.71	56.1%	0.08	C
	PM Peak	52	61	113	186	84%	0.83	51.8%	0.07	B
Western Ave W of Elsinor St	AM Peak	12	24	36	36	66%	0.67	28.2%	0.01	A
	PM Peak	20	40	60	60	66%	0.70	31.4%	0.03	A
Leeman HW just E of Congress	AM Peak	271	262	533	529	50%	0.94	58.8%	0.18	C
	PM Peak	490	565	1,055	1,043	54%	0.79	76.8%	0.41	D
Congress S. of Shopping Ctr	AM Peak	318	386	704	711	55%	0.94	64.7%	0.24	C
	PM Peak	574	497	1,071	1,079	51%	0.96	74.1%	0.35	D
Shopping Ctr Dr. E. of Congress	AM Peak	125	110	235	237	53%	0.94	41.6%	0.08	B
	PM Peak	274	266	540	549	50%	0.96	60.6%	0.18	C
Congress N. of Shopping Ctr	AM Peak	276	359	635	641	57%	0.94	63.3%	0.21	C
	PM Peak	544	475	1,019	996	52%	0.96	72.2%	0.32	D
Court St. E. of Shopping Ctr	AM Peak	97	87	184	188	52%	0.90	37.5%	0.07	A
	PM Peak	297	165	462	433	62%	0.93	54.7%	0.15	B

Bath Feasibility Study

2002 Roadway Analysis Summary

Location	Period	ATR Counts NB / EB	ATR Counts SB / WB	ATR Counts Total	Peak Volume	Directional Distribution	PHF	% Time Spent Following	V/C Ratio	LOS
High St. between EB & WB Ramps	AM Peak	393	146	539	**554**	**73%**	**0.90**	**45.4%**	**0.10**	**B**
	PM Peak	663	355	1,018	**1,055**	**65%**	**0.81**	**77.4%**	**0.41**	**D**
Centre St. W. of High St.	AM Peak	150	145	295	**283**	**54%**	**0.93**	**44.7%**	**0.10**	**B**
	PM Peak	234	246	480	**658**	**66%**	**0.93**	**63.0%**	**0.22**	**C**
Middle St. N. of Centre St.	AM Peak	51	44	95	**108**	**58%**	**0.90**	**30.2%**	**0.06**	**A**
	PM Peak	122	82	204	**227**	**57%**	**0.86**	**43.2%**	**0.12**	**B**
Centre St. E. of Washington	AM Peak	151	53	204	**209**	**74%**	**0.92**	**45.6%**	**0.07**	**B**
	PM Peak	304	233	537	**552**	**59%**	**0.91**	**61.8%**	**0.19**	**C**
Centre St. E. of Water	AM Peak	93	37	130	**134**	**72%**	**0.86**	**38.9%**	**0.05**	**A**
	PM Peak	172	87	259	**255**	**63%**	**0.87**	**46.8%**	**0.09**	**B**
Front St. S. of Centre	AM Peak	144	24	168	**173**	**86%**	**0.86**	**55.5%**	**0.09**	**C**
	PM Peak	271	49	320	**320**	**86%**	**0.87**	**63.5%**	**0.16**	**C**

Roadway Level-of-Service (LOS) Criteria

% Time Spent Following	LOS
less than or equal to 40%	A
>40% up to 55%	B
>55% up to 70%	C
>70% up to 85%	D
>85%	E
LOS F occurs whenever V/C ratio exceed 1.0	

Multilane Highway Analysis Summary - 2002 DHV's

ID#	Location	Period	Peak Volume		Peak Hour Factor		% Trucks	% RV (Single U)	Density (pc/mi/ln)		LOS	
			EB	WB	EB	WB			EB	WB	EB	WB
1	US-1, over Sagadahoc Bridge	AM Peak	653	1,031	0.92	0.96	5%	5%	6.7	10.7	A	A
		PM Peak	1,826	1,451	0.79	0.93	4%	4%	22.7	15.3	C	B
2	US-1, E. of Congress Ave. Ramps	AM Peak	945	1,105	0.93	0.95	5%	5%	12.7	14.5	B	B
		PM Peak	1,743	1,933	0.93	0.78	3%	3%	23.6	31.2	C	D
3	US-1, W. of Congress Ave. Ramps	AM Peak	800	1,100	0.92	0.92	5%	6%	9.6	13.5	A	B
		PM Peak	1,361	1,195	0.91	0.71	3%	4%	17.4	20.0	B	C

Roadway Level-of-Service (LOS) Criteria

Density (pass cars per mile per lane)	LOS
less than 11 pc / mi / ln	A
> 11 up to 18 pc / mi / ln	B
>18 up to 26 pc / mi / ln	C
>26 up to 35 pc / mi / ln	D
>35 up to 45 pc / mi / ln	E
>45 pc / mi / ln	F

Ramp Analysis Summary - 2002 DHV's

ID#	Location	Period	Peak Volume		Density (pc/mi/ln)	LOS
			Road	Ramp		
1	US-1 EB @ High St. Off-Ramp	AM Peak	795	150	13.3	B
		PM Peak	1,444	299	22.7	C
2	US-1 WB @ High St. On-Ramp	AM Peak	869	273	16.0	B
		PM Peak	1,553	483	24.7	C
3	US-1 EB @ Leeman Hwy On-Ramp	AM Peak	682	263	13.6	B
		PM Peak	1,320	423	21.1	C

Note: Volumes came from systemwide peak hour model, used in Synchro analysis

Roadway Level-of-Service (LOS) Criteria

Density (pass cars per mile per lane)	LOS
less than 10 pc / mi / ln	A
> 10 up to 20 pc / mi / ln	B
>20 up to 28 pc / mi / ln	C
>28 up to 35 pc / mi / ln	D
>35 pc / mi / ln	E
LOS F occurs when road volume exceeds capacity	

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Technical Memorandum

To: File: 36527-PL-001-005 **Date:** March 18, 2004

From: Dennis W. Reip

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Conceptual Structural Engineering

Objective

Conceptual structural engineering has been performed to identify the preliminary geometry and anticipated structure types for the various roadway and rail Options. The conceptual engineering has been limited to establishing the basic geometry and structure type only in an effort to develop a preliminary assessment of the potential construction cost for structures.

Methodology for Structural Geometry and Costs

The arrangement of structures was based on the defined need for bridges, retaining walls, and/or tunnel sections consistent with the preliminary alignments for the various Options. A list of anticipated structures was defined for each of the roadway and rail Options.

Preliminary estimates of construction cost were based on average square foot and linear foot unit costs consistent with Maine DOT and industry standards. In the case of bridges, basic square foot unit costs for similar projects were used. For the depressed and tunnel sections, the major elements of construction were defined first (i.e. excavation, concrete, etc.) followed by an added contingency factor to account for uncertainties and incidentals.

Consideration of feasibility of the structure types is limited to consideration of basic geometry. Subsurface conditions influencing the foundations and constructability are generally unknown and have not been investigated at this phase of conceptual development.

Results

The attached worksheet tabulates the defined structure types and anticipated structure construction costs for the various roadway and rail Options. The footnoted comments identify some of the limiting assumptions.

The next step for further consideration of any of the Options will require additional preliminary engineering including investigation of subsurface conditions, verification of geometric constraints, and a preliminary analysis of the structures.

Bath Feasibility Study
Concept Development - Preliminary Construction Costs
Structures

Roadway Options

	Structure		Geometry			Unit Cost		Calculated	Rounded	
Option	Location	Description	Length (ft.)	W or H (ft.)	Area (sf)	per LF	per SF	Cost	Cost	Comments
C3A	Western Ave.	Bridge over Rt 1			16500	$0	$150	$2,475,000		
	Route 1	Retaining Walls (Major)	1600	14	22400	$0	$150	$3,360,000		2
								$5,835,000	**$6,000,000**	
D1	Route 1	Demo Viaduct	1400	35	49000	$0	$50	$2,450,000		
	High St.	Bridge over Rt 1			9600	$0	$150	$1,440,000		
	Route 1	New Viaduct	1400	62	86800	$0	$150	$13,020,000		
	Ramp	New Viaduct Off-Ramp	1100	26	28600	$0	$150	$4,290,000		
	Route 1	Retaining Walls (Std)	390	10	3900	$0	$50	$195,000		3
								$21,395,000	**$21,000,000**	
D2	Route 1	Demo Viaduct	1400	35	49000	$0	$50	$2,450,000		
	High St.	Bridge over Rt 1			9600	$0	$150	$1,440,000		
								$3,890,000	**$4,000,000**	
D3	Route 1	Demo Viaduct	1400	35	49000	$0	$50	$2,450,000		
	High St.	Bridge over Rt 1			9600	$0	$150	$1,440,000		
	Wash&RR	Bridge over Rt 1			7350	$0	$300	$2,205,000		
	Route 1	Retaining Walls (Major)			28600	$0	$150	$4,290,000		4
								$10,385,000	**$10,000,000**	
D4	Route 1	Demo Viaduct	1400	35	49000	$0	$50	$2,450,000		
	High St.	Bridge over Rt 1			9600	$0	$150	$1,440,000		
	Wash	Bridge over Rt 1			6000	$0	$150	$900,000		
	Middle St.	Bridge over Rt 1			4800	$0	$150	$720,000		
	Ped. Bridge	Tunnel under Rt. 1			3200	$0	$150	$480,000		
	Wash&Middle	Approach Walls (ret. fill)			4800	$0	$50	$240,000		3
								$6,230,000	**$7,000,000**	
D5	Route 1	Demo Viaduct	1400	35	49000	$0	$50	$2,450,000		
	Route 1	Mainline Tunnel	750	75	56250	$24,000	$0	$18,000,000		4
	Route 1	2 Ramp Tunnels	2150	40	86000	$14,000	$0	$30,100,000		4
	Route 1	Walls at West Portal	2400	11	26400	$0	$50	$1,320,000		3
								$51,870,000	**$52,000,000**	
Rail Options										
Alignment 1	Along Rt. 1	Local Road over RR	50	56	2800	$0	$185	$518,000		
	Along Rt. 1	Local Road over RR	50	52	2600	$0	$185	$481,000		
	Along Rt. 1	Local Road over RR	50	44	2200	$0	$185	$407,000		
								$1,406,000	**$1,500,000**	
Alignment 3	Woolwich	Local Road over RR	50	44	2200	$0	$185	$407,000		
	Route 1	Viaduct over Route 1	1700		0	$5,000	$0	$8,500,000		
	Woolwich	Viaduct transition to grade	300		0	$5,000	$0	$1,500,000		
	Carlton Bridge	Raise bridge - taller piers			0	$0	$0	$4,100,000		lump sum
								$14,507,000	**$15,000,000**	
Alignment 5	Along Rt. 1	SB Route 1	50	84	4200	$0	$185	$777,000		
	Along Rt. 1	NB Route 1	50	100	5000	$0	$185	$925,000		
	Along Rt. 1	Local Road over RR	50	56	2800	$0	$185	$518,000		
	Along Rt. 1	Local Road over RR	50	52	2600	$0	$185	$481,000		
	Along Rt. 1	Local Road over RR	50	44	2200	$0	$185	$407,000		
								$3,108,000	**$3,200,000**	

Individual Rail Option "Components"

Various Rail	Downtown	RR Viaduct	2000	22	44000	$5,000	$0	**$10,000,000**	**$10,000,000**	5, 8
	Kennebec River	On Upper Level Carlton Bridge						**$4,647,000**	**$4,600,000**	9
	Kennebec River	Carlton Bridge raised 20 ft.						**$4,128,000**	**$4,100,000**	9,10
	Kennebec River	New Low Level Fixed Bridge	2250	25	56250	$8,000	$0	**$18,000,000**	**$18,000,000**	5, 6, 11
	Kennebec River	New Movable Structure	250	25	6250	$80,000	$0	**$20,000,000**	**$20,000,000**	5, 7, 11

Comments

All Options - Subsurface conditions are generally unknown and have not been investigated at this Phase of conceptual development.
All Options - The assumed limits of work and structural geometry is approximate based on the preliminary alignments.
2 Conventional walls are assumed to be feasible. Groundwater and excavation are assumed not to be a major design issue.
3 Anticipated wall limits are based on preliminary roadway aligments and may vary.
4 Technical feasibility of depressed/tunnel options has not been investigated with respect subsurface design issues (i.e. excavation support, foundation requirements, control of ground water, flood conditions, ventilation, etc,).
5 Limits (length) of structure may vary depending on alignment option.
6 Low level fixed approach spans for use with a new movable is considered. Cost of a high level fixed bridge has not been considered due to uncertain profile and clearance requirements.
7 Movable span only. Requires fixed approach spans.
8 2000 LF for Alignment #3 is tabulated.
9 Length extends from existing Pier 1 (Bath) to Pier 8 (Woolwich). Approach viaducts are also required.
10 Requires track to be out-of-service for 9-12 months
11 These options (alignments 6 and 8) were considered, but dropped out during screening.

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Technical Memorandum

To: File: 36527-PL-001-005 **Date:** March 18, 2004

From: Don Ettinger

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Cost Estimates - Roadway

Cost estimating of Roadway Options was completed as part of the Bath Feasibility Study. Below is a summary of the Option descriptions, methodology used, and results for each of the roadway Options.

The Study Area was divided into two zones, Commercial zone and Downtown zone. The Commercial zone limits were defined from the Congress Avenue overpass to the High Street overpass and are described as the "C" Options. The Downtown zone limits were defined from the High Street overpass to the Sagadahoc Bridge and described as the "D" Options. The roadway Options are summarized below:

- Option C1 – At-Grade
- Option C2 – At-Grade with Signal
- Option C3A – Depressed
- Option D1 – Viaduct
- Option D2 – At-Grade
- Option D3 – Depressed
- Option D4 – Modified At-Grade
- Option D5 – Tunnel
- Route 209 Spur

<u>Methodology for Estimating Roadway Costs</u>

As part of this Study, the conceptual design for each roadway option was developed. This design was limited to the development of the horizontal and vertical geometrics as well as the plan-view layout. One typical section for each option was also developed. The development of cross sections, slope limits (grading limits), and associated earthwork (cuts and fills) was not considered part of this work. The following list summaries the roadway elements and cross section elements included in the conceptual plan-view designs.

<u>Roadway Elements</u>

- Roadway geometric alignments (horizontal & vertical)
- Bridge and tunnel locations
- Access locations to City via ramps and intersections
- Abutting parcel access locations (curb cuts)
- Local road modifications
- Rail realignment locations

Cross Section Elements

- Travel lane requirements
- Inside and outside shoulder requirements
- Turning lane requirements at intersections
- Signalized intersection locations
- Locations of median islands or barrier treatments
- Grass esplanade locations
- Sidewalk locations and widths
- Pedestrian crossing locations (crosswalks, pedestrian bridges & tunnels)
- Retaining wall locations

With the understanding that limited design was done for these Options, a simplified method for estimating roadway cost was preferred. A cost per mile or cost per square foot methodology was considered for this study. Unfortunately, it was deemed not practical to use the cost per mile method as the road layout widths were not uniform and varied substantially along the corridor. So, the square foot cost methodology was utilized in this process. The plan-view areas for each road Option was determined. These areas included the roadway pavement, sidewalks, esplanades, medians, and islands. Two (2) variable square foot costs were applied to the Options. A slightly higher variable cost was applied to the Route 1 corridor Options given its urban and complex nature, where as a slightly lower variable cost was applied to the Route 209 Spur due to its rural nature. The Study Team utilized a Maine DOT internal database of recently completed and constructed projects to determine these average square foot costs. These costs generally include all aspects of the roadway construction including; excavation, placement of fill, roadway base, pavements, curbing, drainage, striping etc.

Signalized intersections were identified during this process. A variable cost per each signalized intersection was applied to the roadway Options. This cost included only the signal fixtures, such as poles, mast arms, signal heads etc. All other intersection costs were included in the square foot cost discussed above.

The assessment of impact to the existing railroad facility was identified for each of the roadway Options. The existing railroad facility is currently grade separated from existing Route 1. Some of the roadway Options will result in an at-grade railroad crossing with Route 1. If an effort to eliminate an at-grade rail crossing with Route 1, rail realignment Options were developed and analyzed. Cost estimates for minor and major rail realignment options were developed and summarized in a Technical Memorandum, entitled “Costs Estimates - Railroad.”

Roadway Cost Variables

• Route 1 pavement cost per square foot	$10
• Route 209 pavement cost per square foot	$7
• Signalized intersection cost per each	$100,000

Methodology for Structural Costs

A separate Technical Memorandum entitled Conceptual Structural Engineering discusses the methodology for determining the structural geometrics and costs. The information provided in that memo and attached worksheet was utilized to develop the structural costs associated with the roadway Options.

Below is a summary of the structural components that were considered in the roadway costs.

- The total square foot area of proposed bridges over Route 1 was determined for each of the roadway Options and a variable cost per square foot was applied to these areas. A separate square foot cost was provided for bridges that carry both vehicle and train loadings. Similarly, the total square foot area for the proposed Route 1 viaduct was determined and a cost per square foot was applied.

- A cost for the demolition of the existing viaduct was included with the D Options.

- The total square foot area of proposed retaining walls was determined for each of the roadway Options and a variable cost per square foot was applied. Two separate wall costs were included to cover major and minor retaining walls. Major retaining walls would be classified as walls where ground water control and/or maintenance of traffic would be required.

- The total square foot area of structural tunnels was determined and a variable cost per square foot was applied.

Structural Cost Variables

• Local road bridge over Route 1 cost per square foot	$150
• Road & rail bridge over Route 1 cost per square foot	$300
• Route 1 viaduct cost per square foot	$150
• Existing viaduct demolition cost	$2,450,000
• Retaining wall cost per square foot (major)	$150
• Retaining wall cost per square foot (minor)	$50
• Tunnel cost per square foot	$340

<u>Results</u>

The table on page 4 of 4 provides the estimated costs for each of the roadway Options studied. Professional and construction engineering and right-of-way were also estimated and included in the table. The engineering cost was estimated to be 25% of the total construction costs. Refer to the table for the estimated engineering costs associated with each of the roadway Options.

Maine Department of Transportation
Bath Feasibility Study

Estimate of Option Costs

		Highway Costs							Additional Costs			
Option	Name	Roadway Pavement Area (sf)	Construction Cost - Roadway Pavement	Intersections	Construction Cost - Intersections	Is Rail Impacted? (minor or major)	HIGHWAY CONSTRUCTION COSTS	STRUCTURAL CONSTRUCTION COSTS	TOTAL CONSTRUCTION COST	Total PE/CE Cost	Right of Way Costs	TOTAL ESTIMATED COST
C1	At Grade	303900	$3,039,000	0	$0	No	$3,039,000	$0	$3,039,000	$759,750	$80,000	**$3,878,750**
C2	At Grade w/Signal	320900	$3,209,000	1	$100,000	No	$3,309,000	$0	$3,309,000	$827,250	$110,000	**$4,246,250**
C3A	Depressed	529400	$5,294,000	1	$100,000	No	$5,394,000	$6,000,000	$11,394,000	$2,848,500	$1,100,000	**$15,342,500**
D1	Viaduct	477100	$4,771,000	2	$200,000	No	$4,971,000	$21,000,000	$25,971,000	$6,492,750	$1,390,000	**$33,853,750**
D2	At Grade	445200	$4,452,000	2	$200,000	Yes, Major	$4,652,000	$4,000,000	$8,652,000	$2,163,000	$1,340,000	**$12,155,000**
D3	Depressed	406300	$4,063,000	1	$100,000	Yes, Minor	$4,163,000	$10,000,000	$14,163,000	$3,540,750	$770,000	**$18,473,750**
D4	Modified At Grade	407000	$4,070,000	0	$0	Yes, Major	$4,070,000	$7,000,000	$11,070,000	$2,767,500	$860,000	**$14,697,500**
D5	Tunnel	392700	$3,927,000	1	$100,000	Yes, Minor	$4,027,000	$52,000,000	$56,027,000	$14,006,750	$780,000	**$70,813,750**
Rte 209	Spur	400000	$2,800,000	3	$300,000	No	$3,100,000	$0	$3,100,000	$775,000	$570,000	**$4,445,000**

Variables

Pavement Cost per Square Foot:	$10
Route 209 Pavement Cost per Square Foot:	$7
Average Cost for Intersections:	$100,000
Bridge & Viaduct Cost per Square Foot:	$150
Bridge Cost (rail & road) per Square Foot:	$300
Retaining Wall Cost per Square Foot (minor):	$50
Retaining Wall Cost per Square Foot (major):	$150
Tunnel Cost per Square Foot:	$340

Notes

1. Professional Engineering and Construction Engineering is estimated to be 25% of the Total Construction Costs.
2. Pedestrian tunnel proposed with Option D4 is quantified as a 20 ft wide bridge.
3. D options include replacement of the High Street Bridge.

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Technical Memorandum

To: File: 36527-PL-001-005 **Date:** November 26, 2003

From: Don Ettinger

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Cost Estimates – Railroad Alignment Options

Cost estimating of Railroad Alignment Options was completed as part of the Bath Feasibility Study. Below is a summary of the methodology used and results for the following railroad options:

- Alignment #1 – At-Grade along Route 1
- Alignment #2 – Viaduct along Route 1
- Alignment #3 – Viaduct over Route 1
- Alignment #5 – Around the Mountain (West Bath) with At-Grade along Route 1
- Alignment #6 – North Bath Crossing
- Alignment #7 – Realignment in City

Cost estimates were not made for Alignments #4, #5A1, #6A1, #6A2, and #8 because these options were dismissed from further consideration as not prudent or feasible.

Methodology for Rail Costs

Horizontal & vertical alignments were developed for each of the rail options. Using the horizontal alignments, the lengths of new track was determined. A variable cost per mile for new track construction was applied to the lengths.

Using the profiles, the depth of excavation or fill was determined along the centerline of track. Volumes for excavation were developed based on an average excavation width of 40 ft. This total volume of excavation was then divided into rock and earth excavation. A visual understanding of the area suggests that bedrock is shallow to existing ground. Additionally, many of the proposed cuts are substantial in depth. With this understanding, rock excavation was estimated to be 80% of the total excavation, with the remaining 20% to be earth excavation. Variable costs per cubic foot were applied to both excavation items.

Rail at-grade crossings with existing roads were identified during this process. A variable cost per crossing was applied to the rail options.

Rail Cost Variables

• Track construction cost per mile	$850,000
• Earth excavation cost per cubic yard	$10
• Rock excavation cost per cubic yard	$20
• At-grade crossing cost per each	$150,000

Methodology for Structural Costs

Roadway bridges over the proposed railroad were identified during this process. The total square foot area of proposed bridges was determined for each of the rail options. A variable cost per square foot for roadway bridges was applied to these areas. The square foot cost for this item was adjusted higher to compensate for shorter span bridges that are typically required for rail crossings.

Rail viaducts or bridges were also identified for each of the rail options. The rail viaduct lengths were determined from review of the rail profiles. A variable cost per linear foot for rail viaduct was applied to the lengths.

Structural requirements to cross the Kennebec River were also considered. Some of the rail options included modifications to the Carlton Bridge in a manner that elevates the track an additional 20 ft. The tracks could be raised by the following two methods; place the tracks on the upper deck (formally the roadway deck), or raise the superstructure onto taller piers. Conceptual costs for each were developed and incorporated into the appropriate rail options.

One rail option requires a new Kennebec River crossing. A 2,250 ft. long, 25 ft. wide structure was determined to be necessary for this crossing. A variable square foot cost for this river structure was applied. The analysis estimated a low level fixed span. Bridge costs would be higher if navigation requirements required a high-level bridge or moveable span bridge.

Structural Cost Variables

• Roadway bridge over rail cost per square foot	$185
• Rail viaduct cost per linear foot	$5,000
• Carlton bridge modification costs	$4,100,000
• New river crossing cost per square foot	$300

Results

The attachment provides the tabulated costs for each of the rail options studied. Professional and construction engineering costs and right-of-way costs were also tabulated and included in the summary. The engineering cost was estimated to be 25% of the total construction costs.

Maine Department of Transportation
Bath Feasibility Study

Cost Estimate of Rail Alignments

		Rail Costs										Structural Costs									Additional Costs				
	Option	Total Track Length (Mi.)	Construction Cost - Rail Track	Earth Excavation (CY) Assume 20% Total Ex	Construction Cost - Earth Excavation	Rock Excavation (CY) Assume 80% Total Ex	Construction Cost - Rock Excavation	At-Grade Crossings	Construction Cost - At Grade Crossings	RAIL CONSTRUCTION COSTS	Bridges Over Rail	Combined Bridge(s) Area (square foot)	Construction Cost - Bridges Over Rail	Rail Viaduct (feet)	Construction Cost - Rail Viaduct	River Crossing Requirements	Construction Cost - River Crossing	Deduct Carlton Bridge Rehabilitation Costs	STRUCTURAL CONSTRUCTION COSTS	TOTAL CONSTRUCTION COST	Total PE/CE Cost	Right of Way Costs	TOTAL ESTIMATED COST	See Notes
Aln #1	At Grade along Rte 1	2.86	$2,431,000	87,200	$872,000	348,700	$6,974,000	5	$750,000	$11,027,000	3	7600	$1,406,000		$0	No	$0	$0	$1,406,000	$12,433,000	$3,108,250	$ 7,040,000	$22,581,250	1
Aln #2	Viaduct Along Rte 1	2.86	$2,431,000	54,600	$546,000	218,500	$4,370,000	5	$750,000	$8,097,000	2	5000	$925,000	3200	$16,000,000	Yes - Raise track on Carlton Bridge	$4,100,000	$0	$21,025,000	$29,122,000	$7,280,500	not estimated	$36,402,500	1,5
Aln #3	Viaduct Over Route 1	0.42	$357,000	0	$0	0	$0	1	$150,000	$507,000	1	2200	$407,000	2000	$10,000,000	Yes - Raise track on Carlton Bridge	$4,100,000	$0	$14,507,000	$15,014,000	$3,753,500	negligible	$18,767,500	1
Aln #5	Around the Mountain (West Bath) with At-Grade along Rte 1	2.69	$2,286,500	42,700	$427,000	170,700	$3,414,000	6	$900,000	$7,027,500	5	16800	$3,108,000		$0	No	$0	$0	$3,108,000	$10,135,500	$2,533,875	$ 7,030,000	$19,699,375	1
Aln #6	North Bath Crossing	2.54	$2,159,000	33,400	$334,000	133,600	$2,672,000	3	$450,000	$5,615,000	1	3500	$647,500		$0	Yes - New Kennebec River Crossing	$16,800,000	$0	$17,447,500	$23,062,500	$5,765,625	not estimated	$28,828,125	1,3,4,5
Aln #7	Realignment in City	0.21	$178,500	0	$0	0	$0	3	$450,000	$628,500	0	0	$0		$0	No	$0	$0	$0	$628,500	$157,125	$ 1,200,000	$1,985,625	1

Variables

New Railroad Track Construction Cost per Mile:	$850,000
Cost of Earth Excavation per Cubic Yard	$10
Cost of Rock Excavation per Cubic Yard	$20
Cost for At-Grade Crossing:	$150,000
Bridge Over Rail Cost (short span) per Square Foot:	$185
Rail Viaduct Cost per Linear Foot:	$5,000

Notes

1. Professional Engineering and Construction Engineering is estimated to be 25% of the Total Construction Costs.
2. Alignments #4 and #8 were evaluated and considered not feasible at this time
3. New river crossing for alignment #6, North Bath Crossing, assumes low level fixed span structure
4. Alignment #6, North Bath Crossing, eliminates current rail access to BIW and the existing train station
5. Right-of-way costs not estimated for Alignments #2 & #6 because these were dismissed as not feasible.

HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005 **Date:** March 17, 2004

From: Don Ettinger

Subject: Maine DOT
Bath Feasibility Study
Maine DOT PIN # 10123.00
Engineering Information Inventory

Methodology

Information on the existing Study Area was obtained by gathering available data such as aerial photographs, existing topography, as-built data, right-of-way information, and design plans. In addition, structural inspection reports for the Carlton Bridge and existing viaduct were obtained.

Information Sources

The following data was gathered to assist in the engineering effort associated with this Study:

- Bath Orthorectified Aerial Color Images, provided by The Greater Portland Council of Governments, 2001
- Bath Aerial Image contour data, provided by The Greater Portland Council of Governments, 1998
- U.S.G.S. Topography, 1980
- Route 209 Bypass Study, provided by Maine DOT, April 1995
- Design plans and as-built information for the Sagadahoc Bridge, provided by Maine DOT, 1997
- Ground survey information for the existing viaduct, provided by Maine DOT, 1997
- Right-of-way plans for the Route 1 Corridor, provided by Maine DOT, 1964
- Property line and right-of-way electronic information, provided by City of Bath, 2003
- As-built plans for the Carlton Bridge, provided by Maine DOT, April 10, 1926
- Inspection reports for the Carlton Bridge and existing viaduct, provided by Maine DOT, dates vary.

Baseline Information

The 2001 aerial color images represent the base mapping used for the conceptual design of the roadway Options. The aerial images were orthorectified by the source to eliminate image distortion caused by the angle in which the photos were taken. The source also adjusted the images to be at the correct scale and proper coordinate system.

The Study Team used these images as base mapping to develop the horizontal alignments and proposed layouts for each of the roadway Options. Roadway conceptual designs were developed directly on top of the aerial images. Property line and right-of-way information was overlaid on the images and used to better understand the State and local right-of-way limits.

Potential property impacts were determined, on a conceptual basis, from review of the design, property limits, and existing land features as shown on the aerial images.

Conceptual design of vertical alignments was developed from numerous baseline sources. Contour data from the 1998 aerial images was used to develop an existing ground surface model of the greater Bath area. This model was utilized in the development of the vertical alignments for the roadway Options and partially for the rail Options. In the existing viaduct area, the 1998 aerial image contours only provide data for the ground beneath the viaduct. Therefore, a second surface model was created from available existing ground survey for the existing viaduct, dated 1997. Additionally, design plans of the Sagadahoc Bridge were referenced such that the design of the downtown roadway Options would properly match the Sagadahoc Bridge location and grades.

A third ground surface model was created by digitizing contours from U.S.G.S. topography maps dated 1980, for areas outside the limits of the available aerial images. This model was necessary for the development of the vertical design of the railroad Options. U.S.G.S. topography maps were also used as a base map for the development of the rail horizontal alignments.

The Route 209 Bypass Study was reviewed and used as a reference in the development of the horizontal alignment and typical cross section for the Route 209 Spur Option. Proposed intersection locations, road alignment, and roadway, sidewalk, and right-of-way widths were incorporated as recommended in the previous Route 209 Bypass Study.

Results of Inventory

The results of this inventory are shown in the engineering documents associated with the road and rail Options. This inventory provides the necessary base data for the development of the conceptual plans, profiles, and typical cross sections for the road and rail Options.

HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005 **Date:** March 18, 2004

From: Don Ettinger

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Roadway Design Criteria

This project includes several types of roadways where the establishment of Design Criteria was necessary. The following summarizes criteria established for U.S. Route 1 (Route 1), State Route 209 Spur (Route 209 Spur), and local roads.

Route 1

U.S. Route 1 is part of the National Highway System (NHS) which is defined as a system of roadways determined to have the greatest national importance to transportation, commerce, and defense in the United States. Route 1 is classified as a Principal Arterial in the State system. From review of the Maine Highway Design Guide, December 2001, (MHDG), the following is a summary of design criteria established for the Study Area.

Cross Section Criteria:

- 35 MPH design speed – Based on urban arterial reconstruction criteria, Table 7-5, page 7-10, MHDG. Existing speed limit in Study Area is 35 MPH and posting of the Sagadahoc Bridge is also 35 MPH.
- 12 ft. Travel Lanes – Based on urban arterial reconstruction criteria, Table 7-5, page 7-10, MHDG
- 5 ft. Paved outside Shoulders – Recommended for bicycle traffic.
- 2-5 ft. Median Shoulders – Recommend 2 ft. curb offset for center island locations. Recommend 5 ft. offset from center concrete median locations because the shy factor for a 35 MPH design speed is 4.59 ft. minimum - see Table 10-6, page 10-29, MHDG. Shy Factor is the distance at which the barrier is no longer perceived as an obstacle by the driver.
- 5 ft. minimum width sidewalks proposed. In high pedestrian traffic locations, 8-10 ft. width sidewalks proposed.

Horizontal Alignment Criteria:

- Design based on a Low-Speed Urban Criteria as design speed is less than 40 MPH.
- Minimum Radius of Curve – 410 feet, per Table 5-9, page 5-27, MHDG, for a 35 MPH design speed.

Vertical Alignment Criteria:

- Stopping Sight Distance – 260 ft. minimum per Table 4-2, page 4-3, MHDG.
- Grades – 0.5% minimum grades to allow for proper drainage. 8% maximum grade per Table 7-5, page 7-10, MHDG, for rolling criteria. Understanding this is a NHS roadway, a 5% maximum grade is preferred. The grade of the Sagadahoc Bridge is approximately 5.2%.
- Ramps –30 MPH design with 7% maximum grade, per Table 9-10, page 9-32, MHDG. Where possible, 5% maximum grades used.

- Vertical Clearance – 16'-6" vertical clearance proposed. Design of new roadway bridges assumed a 16'-6" under clearance and 4'-6" structure depth.

<u>State Route 209 Spur</u>
The State Route 209 Spur is considered an extension of existing State Route 209 (Route 209), from South Bath to the Congress Avenue overpass over Route 1 where full access to Route 1 is provided. Limited access to this spur will be provided at the intersections with Congress Avenue, Route 209, and Washington Avenue. From review of the Maine Highway Design Guide (MHDG), the following is a summary of design criteria established.

<u>Cross Section Criteria:</u>
- 45 MPH design speed – Based on urban arterial reconstruction criteria, Table 7-5, page 7-10, MHDG.
- 12 ft. Travel Lanes – Based on urban arterial reconstruction criteria, Table 7-5, page 7-10, MHDG
- 8 ft. Paved Shoulders – Based on 2-lane facility, Table 7-5, page 7-10, MHDG. Recommended for vehicle breakdown and bicycle traffic.
- 6 ft. minimum width sidewalks proposed per "Route 209 By-pass Feasibility Study," completed by VHB, April 10, 1995, for Maine DOT.

<u>Horizontal Alignment Criteria:</u>
- Design based on a High-Speed Urban Criteria as design speed is 45 MPH.
- Minimum Radius of Curve (west of existing Route 209) – 640 ft. per Table 5-2, page 5-4, MHDG, for a 45 MPH design speed.
- Minimum Radius of Curve (east of existing Route 209) – 295 ft. per Table 5-2, page 5-4, MHDG, for a 30 MPH design speed. A reduced speed is recommended in this area in order to minimize property impacts.

<u>Vertical Alignment Criteria:</u>
- Stopping Sight Distance – 325 ft. minimum per Table 4-2, page 4-3, MHDG.
- Grades – 0.5% minimum grades to allow for proper drainage. 8% maximum grade per Table 7-5, page 7-10, MHDG, for rolling criteria.

<u>Local Roads & Streets</u>
From review of the Maine Highway Design Guide (MHDG), the following is a summary of design criteria established.

<u>Cross Section Criteria:</u>
- 20-25 MPH design speed – Based on urban local roads reconstruction criteria, Table 7-7, page 7-14, MHDG. Existing speed limits in project area varies from 25-30 MPH.
- 11-12 ft. Travel Lanes – Based on urban local roads reconstruction criteria, Table 7-7, page 7-14, MHDG.
- 5 ft. Paved Shoulders – Recommended for bicycle traffic.
- 2 ft. Median Shoulders – Recommend 2 ft. curb offset for center island locations.
- 5 ft. minimum width sidewalks proposed. In high pedestrian traffic locations, 8-10 ft. width sidewalks proposed.

<u>Horizontal Alignment Criteria:</u>
- Design based on a Low-Speed Urban Criteria as design speed is less than 40 MPH.

Vertical Alignment Criteria:

- Stopping Sight Distance (SSD) – 150 ft. minimum per Table 4-2, page 4-3, MHDG for 25 MPH design. Some local road bridges over Route 1 have been designed with 125 ft. SSD & 20MPH design speed.
- Grades – 0.5% minimum grades to allow for proper drainage. 10% maximum grade used per Table 7-7, page 7-14, MHDG. Some local road bridges over Route 1 have been designed with 12% profile grades, in order to minimize impacts to adjacent land.
- Vertical Clearance – 16'-6" vertical clearance proposed. Design of new roadway bridges assumed a 16'-6" under clearance and 4'-6" structure depth.

Wilbur Smith Associates

March 26, 2004

TECHNICAL MEMO

TO: File

FROM: Bruce Hyman, AICP

SUBJECT: MaineDOT
Bath Feasibility Study
MaineDOT PIN # 10123.00
Multimodal Passenger Transportation System: Existing

Purpose

The purpose of the Multimodal Passenger Transportation System analysis is to explore:

- the potential or opportunity for alternative modes to reduce travel demand to the extent that fewer roadway travel lanes might be needed in the future on Route 1 (e.g., two through travel lanes instead of four through travel lanes)
- the compatibility of the various highway build strategies with alternative modes strategies (e.g., does a build strategy complement or conflict with an alternative mode strategy).

This memorandum inventories existing multimodal and travel demand management systems and programs.

Methodology

Information regarding the Multimodal Passenger System was collected through:

- Assembly of previous and ongoing plans and studies for the Route 1 Corridor from known/identified sources
- Interviews with key MaineDOT staff responsible for the passenger systems in the Corridor and City of Bath staff.

Information Sources

Reports/plans gathered included:

- *Bicycle-Pedestrian System* – Androscoggin-Kennebec Trail Concept Alignments (map, draft Oct 2003), TY Lin/DeWan & Associates; East Coast Greenway On-road Bicycle Route (2000), MaineDOT; field review, (2003), WSA, ; Bath Waterfront/Downtown Action Plan (1998), WSA; Explore Maine (January 2002), MaineDOT.
- *Passenger Rail* – Portland North Service Extension and Downeaster Service: Business Plan (August 2003 draft), VHB; Rail Station with Park and Ride Lot: Site Evaluation Study (2002), Stafford Business Advisors; Explore Maine (January 2002), MaineDOT; Maine Strategic Passenger Plan, Final Report, (July 1997) Wilbur Smith Associates.
- *Travel Demand Management* – US Route 1 Mid-Coast Transportation Study: Bath to Belfast, Maine (1993), VHB; Draft Analysis of Alternatives for the Wiscasset Area

Transportation Corridor (1996), MaineDOT; Wiscasset Route 1 Corridor Study (various materials, 2002), MaineDOT.

- *Passenger Ferry* – Explore Maine (January 2002), MaineDOT; Maine Strategic Passenger Plan, Final Report, (July 1997) Wilbur Smith Associates.
- *Intercity Bus* – Concord Trailways, timetable and fares, 2003; Explore Maine (January 2002), MaineDOT.
- *Local Fixed Route Bus / Trolley Service* – Route map and timetable, City of Bath, 2003.
- *Tourism* – Travel and Tourism in Maine: 2001 Visitor Study, Longwoods International for the Maine Office of Tourism.

Baseline Information

Tourism Travel

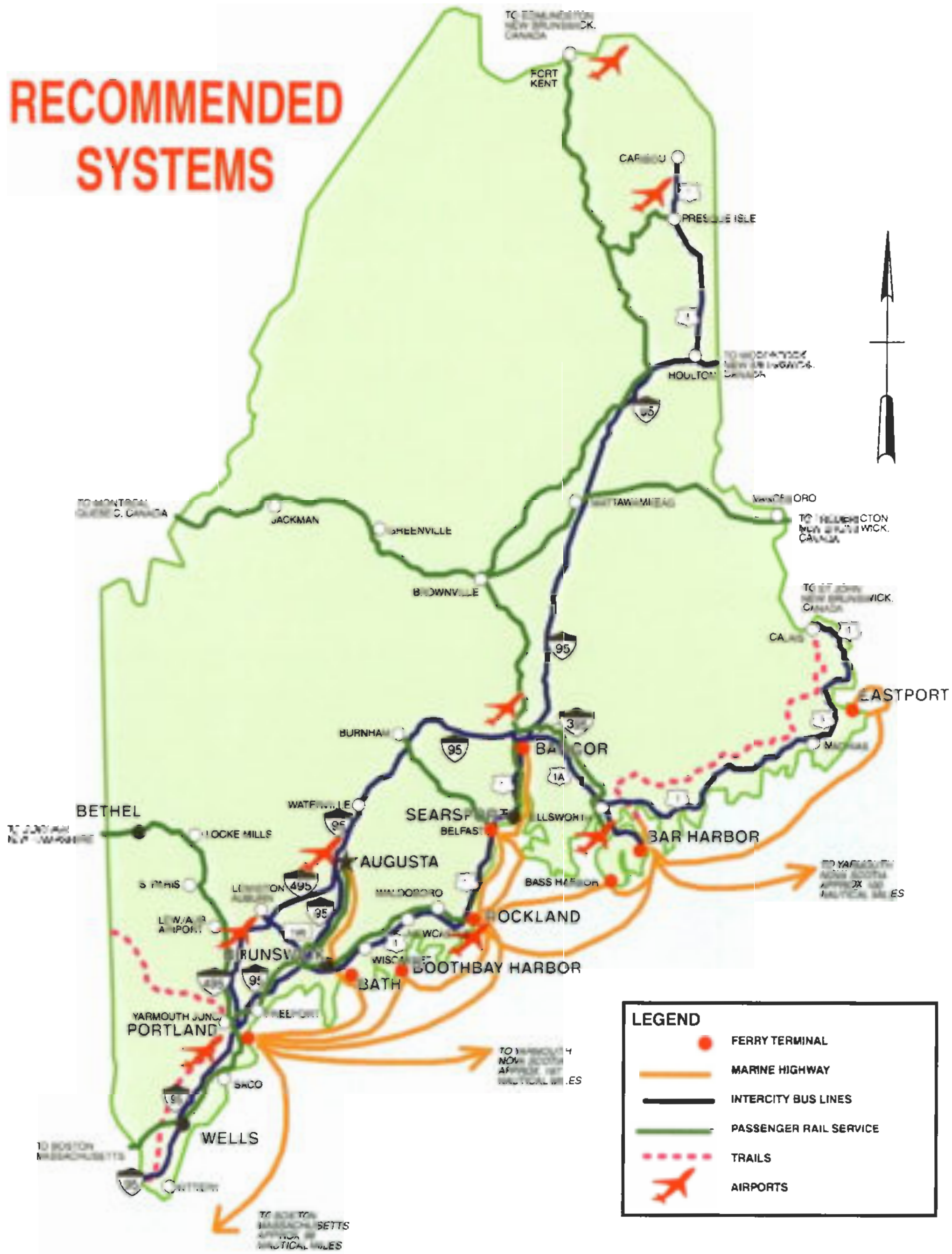
The Maine Office of Tourism's most recent tourism travel survey (2001) indicates that 59% of the 4.3 million overnight tourist travel trips ('overnight marketable pleasure trips') occur during the July to September months. Three quarters of those traveling used their personal automobile. This travel contributes significantly to the high seasonal spike in traffic on Route 1 through Bath. Twenty five percent of overnight travelers visited the Midcoast region and 28% visited the 'Downeast Acadia' region (primarily Acadia National Park). The data show that many visited both (and additional) regions in Maine – with 'touring Maine' the number one purpose cited for visiting Maine (Travel and Tourism in Maine: 2001 Visitor Study, Maine Office of Tourism).

Explore Maine Initiative

The Explore Maine initiative is a coordinated program of the MaineDOT Office of Passenger Transportation to strategically re-introduce public passenger transportation systems to the State. The systems are designed to leverage the market potential of the tourist travel market to develop these networks that would also benefit Maine's residents. The systems are planned to be implemented along the coastal corridor first to help reduce seasonal congestion and tap into this high tourist travel market and then expanded statewide over a 20 plus year period. Figure 1 illustrates this passenger system. The system includes:

- Passenger rail service
- Passenger ferry service
- Intercity Bus service
- Airports with regularly scheduled passenger air service
- A statewide network of Shared use paths
- Intermodal passenger terminals to provide transfers between passenger modes.

The system is designed to offer visitors and Maine residents a seamless transportation experience, offering an integrated series of travel options that reduce or eliminate the need to travel to or within Maine by private automobile (Explore Maine, January 2002, MaineDOT; Maine Strategic Passenger Plan, Final Report, July 1997, Wilbur Smith Associates).



Explore Maine
MaineDOT

Figure 1
Image Source: MaineDOT, 2001

Bicycle-Pedestrian System

Pedestrian. Within the downtown area, sidewalks are located on both sides of most all City of Bath streets. Within the Route 1 Corridor, there are no sidewalks along Route 1 west of High Street or from High Street to Middle Street. There are indications of demand for sidewalks due to 'beaten paths' along side the roadway. West of High Street along Route 1 on both sides, numerous curb cuts interrupt the area where sidewalks would be located.

The Bath Waterfront/Downtown Action Plan envisions a revitalized downtown Bath that places renewed emphasis on the pedestrian orientation of all development/redevelopment. Particular emphasis is placed on stronger pedestrian access downtown across the Route 1 Corridor from the north and south and reducing the physical and visual barrier effect of the current viaduct design and configuration.

Bicycles. Because of its roadway design bicycles are prohibited on Route 1 from Brunswick to Bath to the Bath side of the Sagadahoc Bridge. Bicycles are allowed on the paved shoulder of the Sagadahoc Bridge. Southbound Route 1 bicyclists exit the Sagadahoc Bridge at the Front Street ramp. Northbound Route 1 bicyclists access the Sagadahoc Bridge from the Leeman Highway Frontage Road on-ramp near Washington Street.

The on-road route of the East Coast Greenway travels from Brunswick to Bath using the following route: Androscoggin River Pathway, Old Bath Road (in Brunswick), Old Brunswick Road, North Street, Commercial Street to the Sagadahoc Bridge.

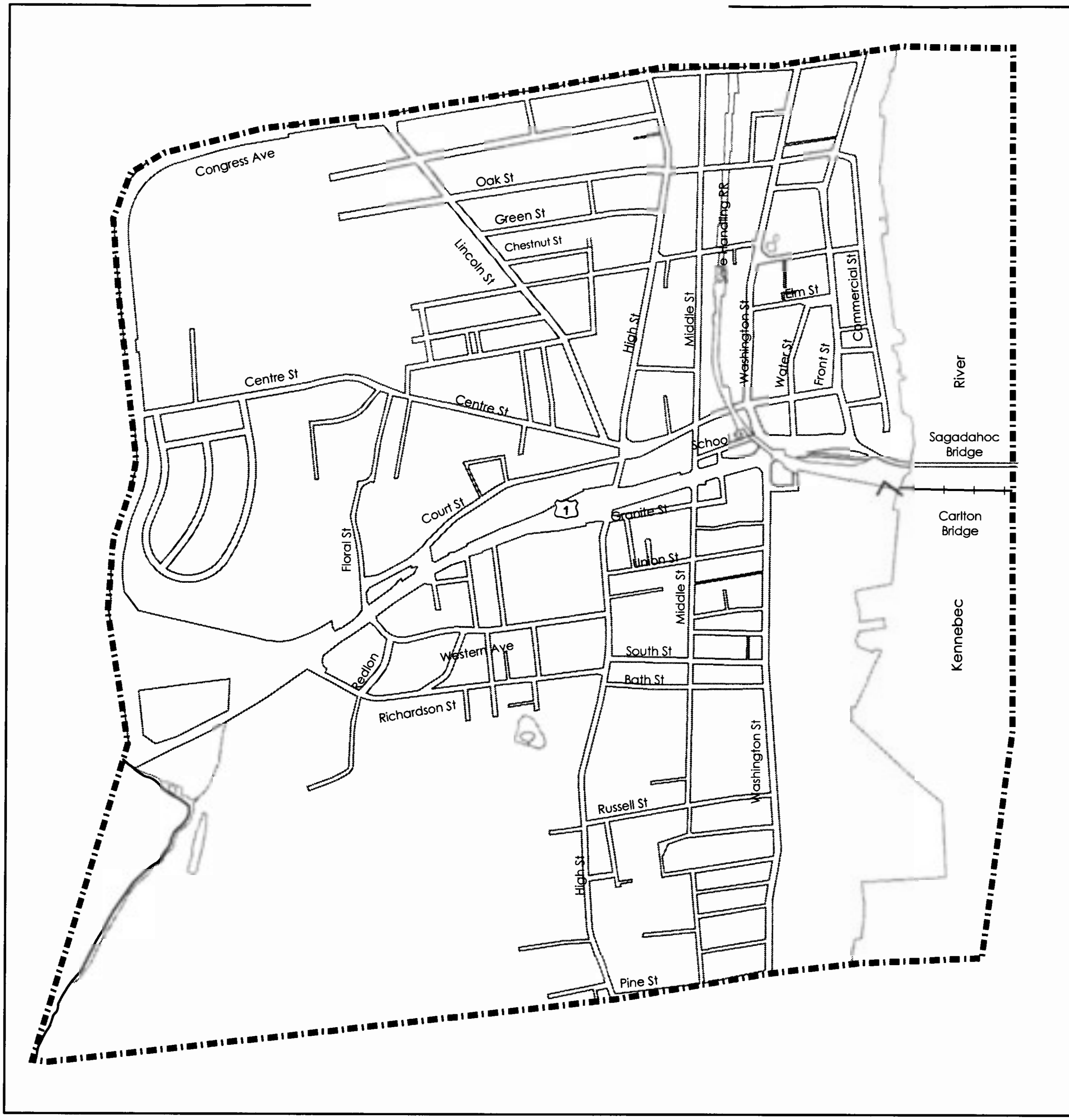
Route 1 in the Study Area does not currently have a paved shoulder except on the Sagadahoc Bridge. There are no designated bicycle routes on other City of Bath streets in the Study Area.

Shared Use Pathway/Trail. The MaineDOT is investigating routes to provide a long term route for the East Coast Greenway and to extend the Androscoggin River Pathway to connect Brunswick, West Bath and Bath. TY Lin and TJ DeWan & Associates recommend (personal communication, Fall 2003) a new pathway that would parallel the north side of southbound Route 1 from the current terminus of the Androscoggin River Pathway to the Congress Avenue Interchange. Additional pathway would continue along Congress Avenue just beyond the Shopping Center Driveway where the facility would transition to an on-road facility (paved shoulders or bike lanes) to North Street, where the 'trail' would continue on-road/along North Street to Commercial Street. The trail would follow sidewalks and the roadway along Commercial Street to the Sagadahoc Bridge.

Passenger Rail Service

There is currently no scheduled passenger rail service in the Study Area. The Explore Maine initiative of the MaineDOT (the implementation program of the Strategic Passenger Transportation Plan, 1997) envisions a statewide passenger rail system (and other complementary transportation networks such as passenger ferry, intercity bus and shared use paths) to be implemented over a 20 plus year time frame. Highest priority service is scheduled to commence in areas that might impact (through direct rail service or connecting intercity bus service) the Route 1 Corridor through Bath (service from Portland to Brunswick, Brunswick to Rockland and Portland to Lewiston-Auburn).

Downeaster/Amtrak service from Boston to Portland commenced in December 2001. Service planning is underway to extend the passenger rail service to Brunswick. It is anticipated that



Roadways

Study Area

Bath Feasibility Study
Highway Study Area

Maine DOT PIN 10123.00

Feet
0 250 500 1,000 1,500 2,000

service would begin in 2007. Construction, engineering and right of way acquisition costs for the Portland to Brunswick rail corridor are estimated at $58.8 million (Portland North Service Extension: Business Plan, VHB, August 2003 Draft).

The Rockland Branch rail line extends from Brunswick to Rockland through Bath and is owned by the State of Maine. The State has recently invested approximately $30.0 million to rehabilitate/repair/ upgrade the tracks, bridges and grade crossings. An additional $4.0 million in capital investments in passenger rail stations is planned (Portland North Service Extension: Business Plan, VHB, August 2003 Draft). Excursion/tourist trains currently operate on the rail line.

A study for the MaineDOT of Park and Ride Lot needs to complement Commuter Rail service to Bath Iron Works (BIW) estimates a potential/reasonable 20% market share of the 600 day shift workers to BIW originating east of the Kennebec River for commuter rail service (Rail Station with Park and Ride Lot: Site Evaluation Study, Stafford Business Advisors, 2002). This 20% share would represent 120 BIW workers.

<u>Travel Demand Management</u>

Travel demand management (TDM) is a set of transportation and other measures designed to reduce the demand for travel, generally for work-related trips during the morning and afternoon peak hours. These measures include, but are not limited to, the promotion of: transit (bus and/or rail), bicycling, walking, carpool/vanpool, telecommute, flexible work hours to reduce peak hour commuting, land use regulations to reduce travel demand, and parking pricing (e.g., 'cashing out' parking). TDM programs work best where there are large employers or high concentrations of office workers *and* there are compelling rationales for enacting stringent TDM programs. These rationales may include serious congestion, air quality problems or a shortage of parking (or land to devote to parking). Typical TDM programs take a 'carrot and stick' approach, offering incentives (preferred parking location for carpools/vanpools) and disincentives (increased charge for on-site parking, more distant parking location).

In the Route 1 Corridor, two primary markets for TDM strategies would be BIW employees and summer and fall tourist travelers. In 2002, BIW employed approximately 6.500 workers in Bath. BIW officials estimate that sixty percent of its workers participate in carpools or vanpools (*Passenger Rail Service: Rail Station with Park and Ride Lot, Site Evaluation Study*, Stafford Business Advisors, December 2002).

Subscription commuter bus service is offered from the Portland, Lewiston-Auburn and north of Bath Route 1 corridor. Five buses are used for the service. Two are operated from the Portland area by the Regional Transportation Program (RTP); two are operated by Coastal Trans (one from Rockland, one from Augusta); a fifth bus operates from the Lewiston-Auburn area. Subscription rates for the services are high.

The US Route 1 Mid-Coast Transportation Study by the MaineDOT (VHB, 1993) evaluated a broad range of TDM measures for their potential effectiveness at reducing travel demand in the Route 1 Corridor. These measures and their potential range of impact on travel by specific target travel markets in the corridor are as follows:

- Park and Ride Lots (work trips), 2% to 15%
- Ridesharing (Carpool and Vanpool) (work trips), 1.5% to 7%
- Work Schedule Changes (work trips), 0% to 3%
- Intercity Bus (all trips), 1% to 3%

- Shuttle Bus (tourist trips), 5% to 20%
- Intercity Rail (all trips), 3% to 10%
- Bath Commuter Rail (BIW work trips), 10% to 20%
- Water/Ferry Transportation (tourist trips), 3% to 5%
- Water/Ferry Transportation (all trips), 3% to 5%
- Water/Ferry Transportation (work trips), 5% to 20%
- Tourist Fringe Parking Lots (tourist trips), 10% to 40%
- Bicycles (all trips), 0% to 3%
- Signage (all trips), 20% to 50%.

The results of the 1993 analysis showed that a 'reasonable' package of TDM measures might reduce future year (2005) summer daily traffic by just over 2% per day while a 'vision' plan that included commuter and passenger rail in the corridor might reduce daily summer traffic volumes by just under 4% per day (a reduction of approximately 2,600 vehicle trips per summer day out of a projected 42,300 vehicles in 2005 on the (then) Carlton Bridge).

The 1997 (revised) analysis of TDM measures in the Wiscasset area (using a similar approach and palette of TDM measures to the 1993 Route 1 Study) projected a 7% to 8% reduction in daily summer trips west of Wiscasset on Route 1 (*Draft Analysis of Alternatives for the Wiscasset Area Transportation Corridor*, MaineDOT). It includes the estimate that 35% of the through trips (those trips beginning in Brunswick and ending in or north of Belfast) could be diverted or rescheduled via variable message signs on I-295 (then I-95). A subsequent study is re-evaluating travel demand in the corridor.

<u>Passenger Ferry Service</u>

Passenger Ferry Service is a major component of the Explore Maine initiative. The program envisions a multi-tiered network of inter-coastal ferry service with some supporting intra-coastal service (up-river connections on the Kennebec River to Augusta and the Penobscot River to Bangor). Portland, Rockland and Bar Harbor would anchor the network and be the primary destinations for travelers. Other planned inter-coastal hubs include Bath, Boothbay Harbor, Belfast and Bass Harbor and Eastport.

The Maine Strategic Passenger Plan (Wilbur Smith Associates, July 1997) identifies 'new seasonal tourists and visitors' as the most likely market for these ferry services. The Plan suggests that up to 25% to 33% of the potential 90,000 new annual visitors in this group could be attracted to ferry service. It also suggests that a much smaller percentage (in the range of 5% to 10%) of the much larger pool of 'current seasonal residents and visitors' could be attracted to the service. One of the main objectives of these services is to reduce tourist traffic along the Route 1-Midcoast Maine corridor. The services would provide seamless transfers from other modes such as intercity bus and passenger rail in the corridor.

Currently, Long Reach Cruises operates a seasonal excursion-type ferry service from Bath's waterfront. Its 49 seat vessel is capable of inland ferry service to Augusta or inter-coastal service to Boothbay Harbor and points beyond. A 60 seat vessel is being added to its fleet in 2004. It also provides shuttle service from the South End of Bath at the Maine Maritime Museum in concert with the Bath Trolley. Other future opportunities that Long Reach Cruises is exploring include:

- Shuttle ferry service from Bath to Wiscasset-Boothbay Harbor-Five Islands
- Shuttle ferry service from Bath to Popham Beach to reduce parking and traffic congestion at this popular summer destination

- Scheduled ferry service from Bath to Boothbay Harbor to complement future passenger rail service on the Rockland Branch (personal communication, Captain Mike Kiernan, February 2004).

Intercity Bus

Concord Trailways provides two regularly scheduled intercity bus round trips along its Coastal Route that includes Bath. Service is provided from Bangor/Orono to Portland to Boston/Logan Airport.

Local Bus Service

The City of Bath operates the CityBus that operates a north loop and a south loop. The service operates from 7:30 am to 5:30 pm. Each loop runs hourly. In 2001, the service carried just over 9,000 riders. Morning and afternoon commuter runs are also provided by CityBus that coordinate with the day shift hours at BIW.

The Bath Trolley Company offers seasonal trolley service in Bath to key destinations in Bath. It is not operated by the City.

ENGINEERS
PLANNERS
ECONOMISTS
Wilbur Smith Associates

March 26, 2004

TECHNICAL MEMO

TO: File

FROM: Bruce Hyman, AICP

SUBJECT: MaineDOT
Bath Feasibility Study
MaineDOT PIN # 10123.00
Multimodal Passenger Transportation System: Future

Purpose

The purpose of the Multimodal Passenger Transportation System analysis is to explore:

- the potential or opportunity for alternative modes to reduce travel demand to the extent that fewer roadway travel lanes might be needed in the future on Route 1 (e.g., two through travel lanes instead of four through travel lanes)
- the compatibility of the various highway build strategies with alternative modes strategies (e.g., does a build strategy complement or conflict with an alternative mode strategy).

This memorandum examines planned future multimodal and travel demand management systems and opportunities within the context of the Build Strategies of the Bath Route 1 Feasibility Study.

Methodology

Information regarding the Multimodal Passenger System was collected through:

- Assembly of previous and ongoing plans and studies for the Route 1 Corridor from known/identified sources
- Interviews with key MaineDOT staff responsible for the passenger systems in the Corridor and City of Bath staff
- Review of the Bath Feasibility Study Build Strategies.

Information Sources

Reports/plans gathered included:

- *Bath Feasibility Study Conceptual Improvement Options*, HNTB, dated September 9, 2003.
- *Bicycle-Pedestrian System* – Androscoggin-Kennebec Trail Concept Alignments (map, draft Oct 2003), TY Lin/DeWan & Associates; East Coast Greenway On-road Bicycle Route (2000), MaineDOT; field review, (2003), WSA, ; Bath Waterfront/Downtown Action Plan (1998), WSA; Explore Maine (January 2002), MaineDOT.
- *Passenger Rail* – Portland North Service Extension and Downeaster Service: Business Plan (August 2003 draft), VHB; Rail Station with Park and Ride Lot: Site Evaluation

Study (2002), Stafford Business Advisors; Explore Maine (January 2002), MaineDOT; Maine Strategic Passenger Plan, Final Report, (July 1997) Wilbur Smith Associates; Railroad Options Graphic, HNTB, 9/8/03.

- *Travel Demand Management* – US Route 1 Mid-Coast Transportation Study: Bath to Belfast, Maine (1993), VHB; Draft Analysis of Alternatives for the Wiscasset Area Transportation Corridor (1996), MaineDOT; Wiscasset Route 1 Corridor Study (various materials, 2002), MaineDOT.
- *Passenger Ferry* – Explore Maine (January 2002), MaineDOT; Maine Strategic Passenger Plan, Final Report, (July 1997) Wilbur Smith Associates.
- *Intercity Bus* – Concord Trailways, timetable and fares, 2003; Explore Maine (January 2002), MaineDOT.
- *Local Fixed Route Bus / Trolley Service* – Route map and timetable, City of Bath, 2003.
- *Tourism* – Travel and Tourism in Maine: 2001 Visitor Study, Longwoods International for the Maine Office of Tourism.

Implications of the Build Strategies on Multimodal Systems and Opportunities

For the purposes of this study, two zones of distinct character have been identified: the *Commercial Zone*, the Route 1 corridor west of the High Street Interchange in Bath; and, the *Downtown Zone*, the Route 1 corridor east of the High Street Interchange to the Sagadahoc Bridge.

Pedestrian.

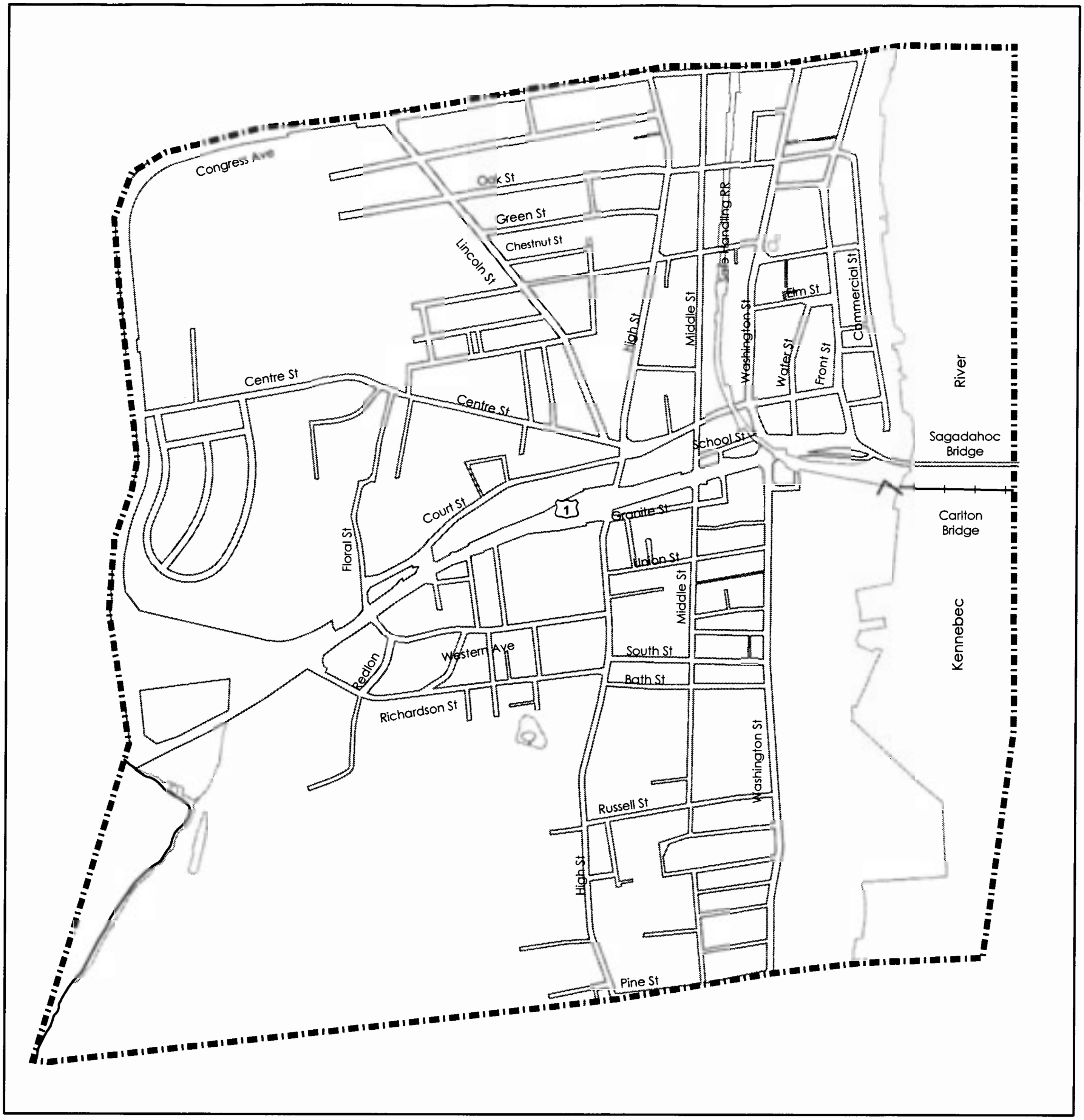
Each of the build strategies incorporates a more extensive sidewalk network than currently exists. There are differences though in the amount, quality and character of pedestrian connectivity provided.

Commercial Zone ('C' Options).

All of the design options in the Commercial Zone have the goal or re-orienting this section of the roadway to greatly improve the aesthetics and quality of the area which would make the area much more pedestrian friendly. The designs also attempt to create a gateway effect (signal to drivers a change in character from interstate highway to urban/city) through landscaping, roadway design details to slow traffic to the speed limit (currently 35 mph).

Options C-1, C-2 and C-3A each provide improved levels of pedestrian access along Route 1 in the Commercial Zone west of High Street. They also provide an improved character for the area through their incorporation of a five foot planting buffer or esplanade in the roadway cross-section between the roadway and sidewalk. These and other design elements are also intended to reduce traffic speeds more in line with the speed limit (35 mph), which would also improve the pedestrian environment.

Options C-3A, through its grade-separated, depressed roadway section, allows the creation of a new signalized intersection at Shaws Plaza/Redlon Road. This provides additional north-south access between the south end neighborhood and the shopping center and north end. Options C-1 and C-2 would require a grade-separated pedestrian crossing to accomplish this connection.



Roadways

Study Area

Bath Feasibility Study
Highway Study Area

Maine DOT PIN 10123.00

Feet

0 250 500 1,000 1,500 2,000

Downtown Zone ('D' Options).

Option D-1, The Viaduct (Elevated Roadway) Option. The elevated viaduct continues the current configuration of separating through traffic (elevated) from local traffic (at-grade). This option is most similar to the roadway and street system that exists today. Enhanced street level sidewalks, crosswalks and aesthetics along the frontage roads would improve the pedestrian environment. North-south pedestrian access is provided at High Street, Middle Street and Washington Street. A newly constructed viaduct presents opportunities to vastly improve the appearance of the viaduct, reducing the physical and visual barrier it currently presents, despite the likely widening of the viaduct from two lanes to four lanes. A new downtown off-ramp from the viaduct to an extension of Commercial Street creates an additional physical and visual presence in the corridor to pedestrians. Option D-1 does not create through-traffic conflicts with pedestrians crossing Route 1.

Option D-2, At-Grade Route 1 Option. The At-Grade Option combines the through traffic and local traffic at ground level. The conceptual cross-section provides enhanced street level sidewalks, crosswalks and aesthetics along the frontage roads and at major street crossings (Middle Street and Washington Street). The heavy summer traffic volumes will require additional turn and through travel lanes that will substantially lengthen street crossing distances (typically seven lanes at intersections) across Route 1 and connecting local streets, negatively impacting pedestrians. Changes in local street connectivity are relatively minor relative to pedestrian movements.

Option D-3, Depressed (Tunnel) Route 1. The Depressed Route 1 Option lowers the four Route 1 travel lanes to below grade, lower than the local street system. The conceptual cross-section provides enhanced street level sidewalks, crosswalks and aesthetics along the frontage roads. Option D-3 would eliminate north-south pedestrian access across Route 1 at Middle Street. Access at Washington Street would be at-grade over the tunnel at a signalized intersection and provide the only north-south access between High Street and Commercial Street. This option would not have the Route 1 through traffic conflicts for pedestrians that are present in Option D-2.

Option D-4, Modified At-Grade Route 1. This option places the Route 1 through lanes at-grade and creates grade-separated crossings at Middle and Washington Streets. North-south pedestrian access across Route 1 is via fairly long structures that extend well past Route 1. These structures will negatively impact pedestrian (and vehicular) access to businesses fronting Washington Street and Middle Street near Route 1. The conceptual cross-section provides enhanced street level sidewalks and aesthetics along Route 1. The likely high speeds of Route 1 traffic will negatively impact pedestrians walking along Route 1 (noise and visually). A pedestrian tunnel through the Sagadahoc Bridge abutment provides additional north-south connectivity for pedestrians. This option would not have the through traffic conflicts for pedestrians that are present in Option D-2.

Option D-5, Modified Depressed Route 1. This option is similar for pedestrians as Option D-3 but keeps north-south pedestrian access at Middle Street.

Railroad Alignment Options. Options that keep or slightly alter the current alignment of the rail right of way through Bath would have little impact on pedestrians, including the option that would elevate the rail generally along the current alignment.

Relocation of the rail line out of the current right of way provides mixed implications for pedestrians (and bicyclists). The current right-of-way would be available potentially for a shared use path that would provide a high quality bicycle and pedestrian linkage in the north end to the downtown.

Relocating the rail line on the south side of the (expanded) Route 1 right of way would likely eliminate the sidewalk along that side due to the amount of right of way required to provide adequate separation. It would also increase the size of a pedestrian crossing over Route 1 in the Commercial Zone due to the need to clear the railroad tracks as well.

Bicycles.

Commercial Zone. The prohibition of use by bicyclists of Route 1 would likely remain for Option C-1 due to the similar functional design of the facility as it is today. Five foot paved shoulders are provided along Route 1 to the Sagadahoc Bridge. The design of Option C-2 may permit bicycle access on Route 1 east of the newly signalized Shaws Plaza/Redlon road intersection. The signal would also permit north-south bicycle access at this point. Option C-3A would allow bicycle access along the new frontage roads outside the depressed Route 1.

A grade-separated crossing with Option C-1 would provide north-south bicycle access in the vicinity of Shaws Plaza/Redlon Road.

Shared Use Pathway/Trail.

None of the options in the commercial or downtown zones positively or negatively affects the proposed alignment of the Androscoggin-Kennebec Trail which would leave the Route 1 right of way at Congress Avenue.

Rail Alignment and Configuration.

Two primary options for the rail line were explored: 1) relocating it out of the current right of way (out of the downtown in the north or south ends or along Route 1) or 2) leaving it generally within the current alignment. Relocation of the rail line outside the current alignment has the potential to increase average train speed, making service more attractive to riders.

Keeping the rail line in its current alignment through the North End neighborhoods will necessitate the continued low operating speeds of trains (currently 15 mph) due to the character of the surrounding residential neighborhood and the curvature of the tracks. The low speed through this section increases the travel time of passenger trains, thereby diminishing their time competitiveness with automobile travel. Two configurations within the current alignment were examined: keeping the rail at-grade or elevating the rail to eliminate a possible grade crossing with the at-grade Route 1 options.

Elevation of the tracks in downtown Bath would require additional funds to reconfigure/redesign the train station (the platform would need to be raised to above street level).

Relocation of the rail line outside of the downtown has the potential to increase the average train travel speed but all but eliminates the desirability of Bath as a stop for the train, especially for commuter rail service to BIW. Shuttle connections would need to be made to get visitors or commuters to their destination, decreasing the desirability of rail service to or from Bath.

Potential Corridor Travel Demand Impacts of Travel Demand Management Strategies

Passenger Rail Service

Two primary types of passenger rail service are being considered for the Rockland Branch through Bath: 1) connecting passenger rail service to the planned extension of Amtrak service to Brunswick; and, 2) commuter rail service to BIW.

Amtrak Connecting Service.

The Business Plan (Draft, August 2003) for the Portland to Brunswick forecasts opening year (earliest at 2008) ridership on the Rockland Branch service of 43,500. It forecasts that this could rise to nearly double this in 2026 to 96,750 riders. It assumes that 75% of Rockland Branch riders would continue on to the Amtrak Portland to Brunswick passenger rail route. These forecasts assume service operating for approximately six months per year, from May to October for between one and three roundtrips per day.

Commuter Rail.

The approximately 6,500 employees at BIW represent a desirable market for commuter rail service. The MaineDOT performed a study of passenger rail station needs in Wiscasset (Rail Station with Park and Ride Lot: Site Evaluation Study, Stafford Business Advisors, 2002). An analysis of the zip codes of BIW employees showed that 1000 of the employees lived north/east of the Kennebec River in a potential commuter shed for rail . Similar assumptions would estimate that upwards of 3000 employees might live in the potential commuter shed to the south. The study also estimates that 60% of BIW employees work the day shift.

A 20% market share of potential commuters would result in 360 daily commuters from the south (3000 x 60% x 20%) and 120 daily commuters from the south (1000 x 60% x 20%), with average daily ridership of 960 riders per day (480 commuters x 2). Peak hour reductions on Route 1 (assuming all riders drove alone previously) would be up to 360 from the south and 120 from the north, respectively.

Passenger Ferry Service

There are currently no immediate plans for passenger ferry service. The Multimodal Passenger Transportation System: Existing Technical Memorandum documents that Long Reach Cruises is interested in providing regularly scheduled seasonal ferry service in Bath to accommodate commuters, beach-goers and tourists (personal communication, Captain Mike Kiernan, February 2004).

A market share of 25% of the anticipated 'new visitors' identified in the Strategic Passenger Transportation Plan (Wilbur Smith Associates, 1997) would result in an annual ridership of 22,500 or an average daily ridership of approximately 125 (based upon a 180 day season). For purposes of this study, a daily ridership of 250 passengers was assumed, capturing a small percentage of existing travelers. The peak hour impact on Route 1 is estimated to be approximately 42 vehicles, assuming an average vehicle occupancy of 3 and that half of the ferry riders would be diverted from the peak hour.

Intercity Bus

A doubling of intercity bus service (to four roundtrips per day) would potentially average an additional 200 riders per day (50 riders per bus). This would potentially be a reduction of up to 100 vehicles in the peak hour (assuming all riders drove alone previously).

Local Bus Service

With an increase in economic vitality in Bath and the increase in Bath as a destination, there would be an increased demand for (and increased ridership on) local bus service. It is assumed that an increase in local bus service would have a negligible *additional* reduction in Route 1 traffic beyond those estimated for the other transportation options and modes. Increased ridership would potentially reduce traffic at intersections crossing Route 1.

Variable Message Signs

The MaineDOT estimates that up to 5% of peak hour summer tourism traffic could be diverted from the Route 1 corridor to the I-95 corridor. For purposes of this study, a 3% reduction of Viaduct traffic is assumed. The through-traffic forecast for the Viaduct is 32,000 vehicles per summer day. (The forecast for the Sagadahoc Bridge is approximately 46,000 vehicles per day.) A three percent reduction is approximately 1000 vehicles per day. Peak hour reductions are estimated to be 100 vehicles (one-tenth).

Estimated Traffic Reductions from TDM Measures

Based upon the assumptions documented above, it is estimated that peak hour traffic in the corridor might be reduced by up to approximately 650 vehicles (two direction volume). In the viaduct section of the corridor, this amount would be less, approximately 400 vehicles (two direction volume) . This would have a positive effect on Route 1 intersection lane arrangements and storage length, but is not expected to reduce the number of through lanes required for the viaduct (four) based upon travel demand forecasts.

HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005 **Date:** April 8, 2004

From: Walter Fagerlund and Don Ettinger

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Rail Alignment Options

This memorandum documents the development and feasibility assessment of eight rail alignment options for the Bath Feasibility Study. Alignments were developed to address potential rail/roadway crossing conflicts in the Route 1 corridor, to shorten the rail travel distance (see page 7 of 8) and travel time through the Study Area, and to be compatible with Route 1 roadway options. In consultation with the Maine DOT, the Study Team concluded that at-grade rail crossings of Route 1 would be problematic from safety and operational perspectives. Therefore, rail options were developed that were either grade-separated from Route 1, or did not cross Route 1.

The feasibility assessment and option screening occurred in three screening steps. First, eight rail options were conceived and developed on USGS mapping (see the figure on page 8 of 8) and evaluated using professional judgment with respect to functionality, potential property impacts, engineering issues, and costs. In the first screening step, two of the eight options were dismissed as not feasible. In the second screening, the remaining six options were evaluated based on impact to properties, access to the City of Bath and specifically the existing Bath Station, construction cost, freight access to Bath Iron Works (BIW) and industry, environment, and effects on marine traffic. An Evaluation Matrix (see page 2 of 8) was prepared and presented to the Steering Committee to compare the options. In addition, the options' compatibility with Route 1 roadway options was considered. In the final screening step, four remaining options were further evaluated with respect to property impacts and cost of property acquisitions. All of the options are described below, and it is noted which options were dismissed along with the reasons for dismissal.

Rail Alignment – Option #1 – At-Grade along Route 1

Rail Alignment Option #1 would follow Route 1 on its south side and would begin at the existing rail alignment south of the New Meadows Road interchange. This option would parallel Route 1 into downtown Bath and cross the Kennebec River via the Carlton Bridge on the existing rail deck. Key considerations for Option #1 are:

- This option may be able to take advantage of some existing right of way along Route 1 but would result in substantial impact to homes and businesses along the south side of Route 1, including the Holiday Inn hotel.
- Access to the existing Bath Station and BIW would be similar to that which currently exists.
- In some areas, this option would be on new alignment, but it appears that no existing rail customers would be affected by the relocation.
- The estimated construction cost for this option is approximately $15.5 million, excluding right of way costs. Right of way costs are estimated at approximately $7,040,000.

Evaluation Matrix – Railroad Options

Railroad Options	**Total Rating**	**Property Impacts**	**Access to Bath & Bath Station**	**Costs**	**Freight Access to BIW & Industry**	**Environ-ment**	**Marine Traffic**
Option #1	22	1	5	3	5	3	5
Option #2	14	1	2	1	2	3	5
Option #3	23	5	2	4	2	5	5
Option #5	23	1	5	4	5	3	5
Option #6	8	2	1	1	1	2	1
Option #7	28	3	5	5	5	5	5

Ratings:
5 = Very Positive
4 = Positive
3 = Neutral
2 = Negative
1 = Very Negative

- This Option would require deep earth and rock cuts in some areas in order to satisfy design criteria.
- Natural resource constraints exist for this option at New Meadows River, Whiskeag Creek and other wetlands, but these are not considered to adversely affect its feasibility.
- Marine traffic would not be affected by this option.
- This option would be compatible with all Route 1 options, specifically Options C1, C2, C3A, D1, D2, D3, D4, and D5.

This option was retained through all three screening steps because it would not cross Route 1 and ranked high in the rail evaluation parameters.

Rail Alignment – Option #2 – Viaduct along Route 1

Rail Alignment Option #2 would follow the same route as Option #1, but the railroad would be elevated on a viaduct in two locations, the downtown area and the Congress Avenue area, to reduce earth and rock cut requirements. This option would be elevated in the downtown area approaching the Carlton Bridge. Therefore, it would require adjustments to the Carlton Bridge, either through raising the entire structure or transferring the tracks to the upper deck of the bridge. It is important to note that the Carlton Bridge upper deck is the former roadway deck. Structural modifications are required to transfer the tracks to the upper deck. Key considerations for Option #2 are:

- Similar to Option #1, this route would result in substantial impacts to homes and businesses along the south side of Route 1.

- Since the tracks would now be elevated at the existing train station and adjacent to Bath Iron Works (BIW), considerations would have to be made for accessing the train station and BIW in this area.
- Like Option #1, this option would be on new alignment in some areas. Other than BIW, it appears that no existing rail customers would be affected by the relocation.
- The estimated construction cost for this option is approximately $36 million, excluding right of way costs. Right of way costs were not estimated, but are expected to be similar to those of Option #1.
- Natural resource constraints exist for this option at New Meadows River, Whiskeag Creek and other wetlands, but these are not considered to adversely affect its feasibility.
- Marine traffic would not be affected by this option.
- This option would be compatible with all Route 1 options, specifically Options C1, C2, C3A, D1, D2, D3, D4, and D5.

Like Option #1, this option would not cross Route 1. However, it was dismissed because it ranked considerably lower than Option #1 in most parameters, including its construction cost which would be more than twice the cost of Option #1.

Rail Alignment – Option #3 – Viaduct over Route 1

Rail Alignment Option #3 would preserve the existing railroad horizontal alignment as it crosses Route 1 near Washington Street. However, it would be elevated on a viaduct over Route 1 in order to create a grade-separated crossing of Route 1 to combine with Route 1 options that eliminate the Route 1 viaduct and bring Route 1 to grade. The rail viaduct also would cross over Washington and Center Streets then transition down onto the current vertical and horizontal rail alignment. The tracks would be elevated on the Carlton Bridge similar to Rail Alignment Option #2. Compared to Rail Alignment Option #2, this option would require considerably less new track. Key considerations for Option #3 are:

- Right of way impacts and costs would be negligible.
- Access challenges to the train station and BIW would be similar to those under Option #2.
- Since the majority of this option would be on existing alignment, no existing rail customers would be affected by this option, with the exception of BIW.
- The estimated construction cost for this option is approximately $19 million, excluding right of way costs. Right of way costs are estimated to be negligible.
- Natural resource constraints for this option are minor and are not considered to adversely affect its feasibility.
- Marine traffic would not be affected by this option.
- This option would be compatible with the Route 1 at-grade options, specifically Options C1, C2, C3A, D2 and D4. It would not be compatible with the Route 1 options that propose an elevated Route 1 in the downtown area (Route 1 Option D1). It would not be necessary to elevate the rail in this area under Route 1 Options D3 and D5, which depress Route 1 below grade in the downtown area.

This option was retained through all three screening steps because it is a rail option that would provide for a grade-separated crossing of Route 1 and ranked high in the rail evaluation parameters.

Rail Alignment – Option #4 – Commercial Street

Rail Alignment Option #4 would shift the current downtown rail alignment east to the edge of the Kennebec River and run northerly along Commercial Street to tie into the existing track north of York Street. The shift would require a new curved span off of the Carlton Bridge but would permit continued use of the lower deck of the bridge.

This option was dismissed in the first screening step and is therefore not included in the Evaluation Matrix. It was dismissed for the following reasons. This option would present a potential barrier from the downtown to the west shore of the Kennebec River and to potential waterfront development along Commercial Street. This would be inconsistent with the City of Bath's Comprehensive Plan and Waterfront Master Plan. In addition, residential displacements would be necessary where the alignment would tie back into the exiting alignment north of York Street. For these reasons, the Steering Committee expressed concern with, and opposition to this option, and it was considered not a feasible option. Construction costs were not estimated for this option. Natural resource considerations for this option include bridge pier work in the Kennebec River, but this is not considered a major constraint.

Rail Alignment – Option #5 – Around the Mountain (West Bath) with At-Grade along Route 1

In order to reduce earth and rock cuts in the western portions of Options #1 and #2, additional options were evaluated that take off from the existing rail in the northwest and travel down around the hilly region west of downtown in West Bath. Options #5 and #5A1 would both skirt the outer edges of downtown to the west and connect to Route 1 near the Congress Avenue interchange. The alignments would then follow the same route as Options #1 and #2 along the southerly side of Route 1 through downtown and onto the Carlton Bridge.

Of these two options, Option #5A1 was dismissed due to sharp horizontal curvature, possible impacts to the Junior High School in the area and complexities of crossing Route 1 in the area of the Congress Avenue interchange.

Option #5 lies further west of Option #5A1 on a relatively flat vertical alignment. It would result in reduced impact to properties in its western section and smoother transition into the Congress Avenue interchange compared to Option #5A1. A new grade separated rail crossing of Route 1 would be required just west of the Congress Avenue intersection. Additionally, adjustments to the Congress Avenue interchange such as bridge widening may also be required. East of the Congress Avenue interchange, Option #5 is the same as Option #1. Key considerations for Option #5 are:

- Like Option #1, Option #5 would result in substantial impact to homes and businesses along the south side of Route 1, including the Holiday Inn hotel.
- Access to the existing Bath Station and BIW would be similar to that which currently exists.
- In some areas, this option would be on new alignment, but it appears that no existing rail customers would be affected by the relocation.
- The estimated construction cost for this option is approximately $12.7 million, excluding right of way costs. Right of way costs are estimated at approximately $7,030,000.

- Earth and rock cuts would be less than Option #1.
- Natural resource constraints exist for this option at Whiskeag Creek and other wetlands, but these are not considered to adversely affect its feasibility.
- Marine traffic would not be affected by this option.
- This option would be compatible with all Route 1 options, specifically Options C1, C2, C3A, D1, D2, D3, D4, and D5.

This option was retained through all three screening steps because it is a rail option that would provide for a grade-separated crossing of Route 1 and ranked high in the rail evaluation parameters.

Rail Alignment – Option #6 – North Bath Crossing

The option to bypass the majority of the downtown area via a new route to the north was evaluated with three northerly options, Option #6, #6A1 and #6A2. These options would connect to the existing line north/northwest of downtown and bypass the existing alignment through the downtown. Options #6A1 and #6A2 would split off in northern Bath near the Grace Church and then cross the Kennebec River via a new bridge from a location near the existing fish factory (just south of the sewage treatment facility). Both Options #6A1 and #6A2 were dismissed in the first screening step and so they are not included in the Evaluation Matrix. They were dismissed because their alignments would run through high density areas and historical buildings around this area.

Option #6 was carried further in the evaluation. It would split off of the existing alignment approximately ¾ mile west of Options #6A1 and #6A2, thereby avoiding some of the more densely developed areas of Bath. Key considerations for Option #6 are:

- This alignment travels cross country with limited impacts to high density and historical areas, except in the crossing through North Bath, which has the potential to impact homes and possibly a senior citizen housing and medical services facility.
- Access to Bath and Bath Station would be affected as the rail line would now be approximately 1 ½ miles from the existing station and downtown. Freight access to BIW also would be adversely affected.
- The estimated construction cost for this option is approximately $28.8 million, excluding right of way costs. Right of way costs were not estimated for the option.
- A new bridge would be required over the Kennebec River and moderate cuts are required on the Woolwich side of the river. The bridge over the Kennebec River may affect navigation and further consultation with the U.S. Coast Guard would be required.
- Natural resource constraints exist for this option at Whiskeag Creek and the Kennebec River.
- This option would be compatible with all Route 1 options, specifically Options C1, C2, C3A, D1, D2, D3, D4, and D5.

This option was dismissed because it ranked “negative” or “very negative” in every evaluation parameter and in total, considerably lower than the other options in the Evaluation Matrix.

Rail Alignment – Option #7 – Realignment in City

The Route 1 options that lower Route 1 below grade (Route 1 Options D3 and D5) will provide opportunity to preserve most of the current rail alignment through the city. Rail

Alignment Option #7 would involve the realignment of the rail curve coming off of the Carlton Bridge to accommodate the proposed roadway tunnel design. At grade crossings would result at Washington and Center Streets. Advantages to this design include the preservation of existing track (thereby reducing overall costs) and reduced impact to properties. Additionally, the alignment would permit the continued use of the Carlton Bridge, the existing train station, and continued rail access to BIW. Key considerations for Option #7 are:

- Moderate impact to property compared to other rail options.
- Access to the existing Bath Station and BIW would be similar to that which currently exists.
- No existing rail customers would be adversely affected by this option.
- The estimated construction cost for this option is approximately $800,000, excluding right of way costs. Right of way costs are estimated at approximately $1,850,000.
- Minimal earthwork would be required.
- There are no apparent natural resource constraints, except for work in the floodplain.
- Marine traffic would not be affected by this option.
- This option would be compatible with Route 1 Options C1, C2, C3A, D3 and D5.

This option was retained through all three screening steps because it is a rail option that would provide for a grade-separated crossing of Route 1 and ranked high in the rail evaluation parameters.

Rail Alignment – Option #8 – South Alternative

Rail Alignment Option #8 would extend from Option #5 to bypass the Route 1 corridor and traverse through southern Bath on a similar alignment to the Route 209 Spur. The proposed crossing of the Kennebec River would occur south of BIW and would require the construction of a new bridge over the river. The new bridge design would have to account for river traffic and needs of upstream businesses such as BIW and other water-dependent facilities. Additionally, a second new bridge over the Hanson Bay Channel would be required. Property impacts could be substantial in the area south of BIW which includes some high density residential and possibly historical sites. For these reasons, as well as cost and topographic challenges (high cuts through the area west of the residential section), Option #8 was deemed not feasible in the first screening step.

Other Considerations: Woolwich

For the options involving rail viaducts and the raising of the tracks on the Carlton Bridge (Options #2 and #3), consideration was made for the transition into the Woolwich side of the Kennebec River. The existing alignment currently crosses at grade with an access ramp from Route 1. The access ramp starts from Route 1 and loops under the Sagadahoc Bridge to the present at-grade crossing. From this at-grade crossing, the rail travels under Route 127. The elevation of the tracks will create a grade separated crossing of the access ramp and an at-grade crossing of Route 127. From this point the tracks would transition down to existing track at a rate of 2%, resulting in approximately 1000 feet of transition down over 20 feet of elevation difference from the raising of the tracks. There may also be adjustments to minor crossings in residential areas within this transition zone. Further study would be necessary on the Woolwich side if either of these options were to advance further.

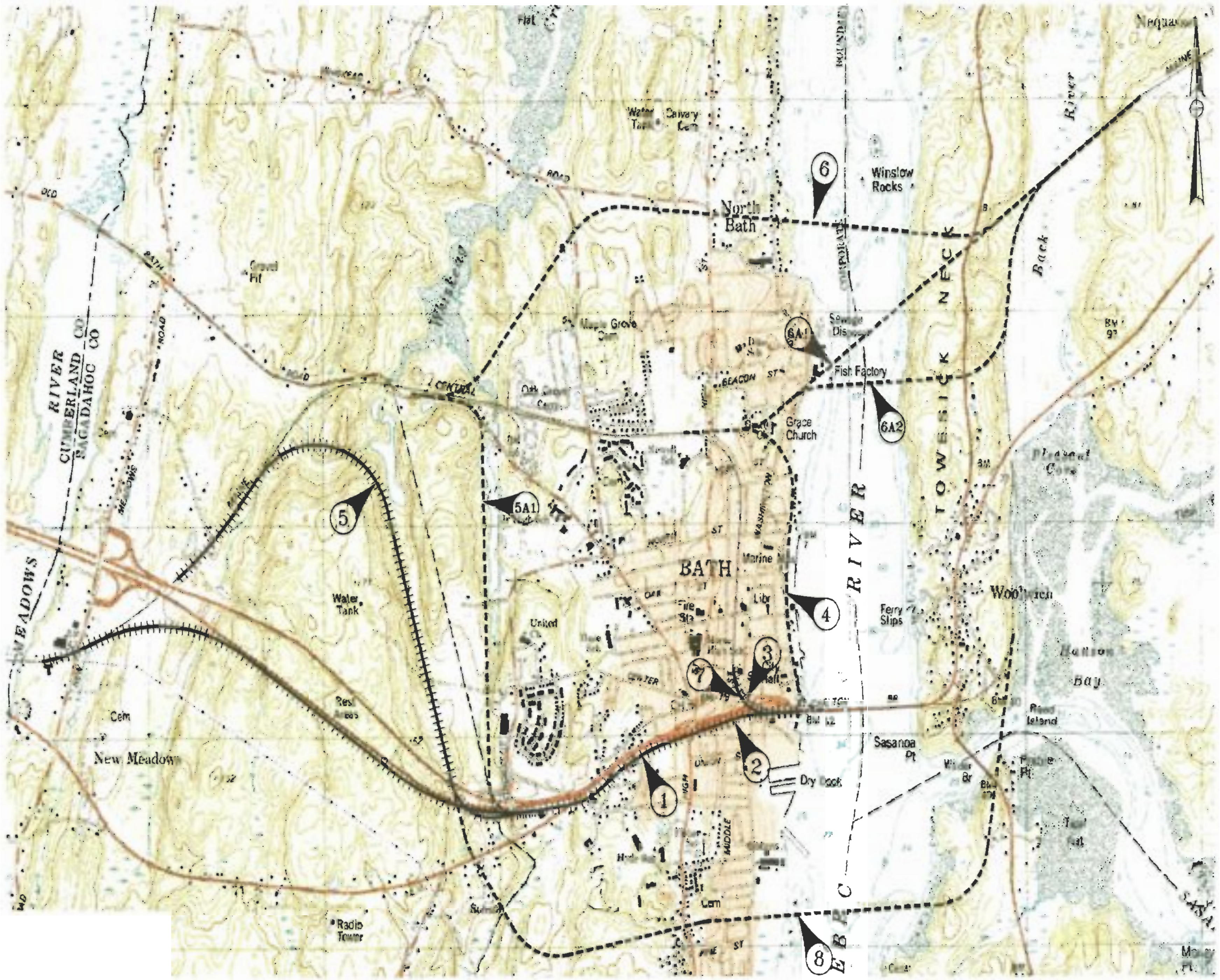
Track Lengths

The following chart illustrates the length of new track required for the rail alignment options compared to the length of track for the existing alignment.

Rail Distance Chart (miles)

Option	New Track Distance	Existing Track Distance	Reduction in Distance	Notes
#1 – At-Grade along Route 1	2.86	3.71	0.85	From New Meadows Road to Carlton Bridge
#2 – Viaduct along Route 1	2.86	3.71	0.85	From New Meadows Road to Carlton Bridge
#3 – Viaduct over Route 1	0.47	0.47	0.00	From Winter St to Carlton Bridge
#4 –Commercial Street	1.19	1.20	0.01	From Sewell School to Carlton Bridge
#5 – Around the Mountain	2.69	2.76	0.07	From Route 1-New Meadows Interchange to Carlton Bridge
#6 – North Bath Crossing	2.54	4.50	1.96	From Whiskeag Creek To Back River crossing
#7 – Realignment in City	0.48	0.47	-0.01	From Winter St to Carlton Bridge
#8 – South Alternative	4.35	4.44	0.09	From Route 1-New Meadows Interchange to Reed Rd, Woolwich

The North Bath Crossing (Option #6) would provide the greatest reduction in track distance and thus the greatest travel time savings. Options #1 and #2 also provide notable reduction in track distance and travel time savings. The remainder of the Options provide little to no reduction in track distance when compared to the existing rail line.



KEY

1. AT-GRADE ALONG ROUTE 1
2. VIADUCT ALONG ROUTE 1
3. VIADUCT OVER ROUTE 1
4. COMMERCIAL STREET
5. AROUND THE MOUNTAIN

5A1 AROUND THE MOUNTAIN (ALTERNATIVE 1)

6. NORTH BATH CROSSING

6A1 NORTH BATH CROSSING (ALTERNATIVE 1)

6A2 NORTH BATH CROSSING (ALTERNATIVE 2)

7. REALIGNMENT IN CITY
8. SOUTH ALTERNATIVE

LEGEND

OPTIONS CONSIDERED & RETAINED

OPTIONS CONSIDERED & DISMISSED

NOTES:

1. BASE MAPPING TAKEN FROM U.S.G.S. TOPOGRAPHIC MAPPING DATED 1980.
2. CONSTRUCTION OF SAGADAHOC BRIDGE OCCURED AFTER 1980, AS A RESULT IT IS NOT SHOWN ON BASE MAPPING.

BATH FEASIBILITY STUDY

RAILROAD OPTIONS

BATH City of Ships

HNTB ARCHITECTS ENGINEERS PLANNERS

2000' 0 2000' 4000'

DATE: 4/15/04

SHEET 8 OF 8

HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005 **Date:** March 30, 2004

From: David House

Subject: Maine DOT
Bath Feasibility Study
MDOT PIN # 10123.00
Railroad Design Criteria

This study includes a railroad alignment which is subject to relocation and for which the establishment of Design Criteria is necessary. Criteria are based on the 2003 *AREMA Manual for Railway Engineering* and the *Maintenance Standards Handbook, State of Maine Owned Track Maintenance of Way*, dated July 3, 2002. The following summarizes criteria established for the railroad alignment.

Design Speeds:
- 40 MPH for freight.
- 60 MPH for passenger.

Horizontal Alignment Criteria:
- Maximum degree of curvature: 12° 30" (12° 30" of curvature equates to a minimum radius of 459')
- Preferred maximum degree of curvature: 6° (Six degrees of curvature equates to a minimum radius of 955')
- Maximum Ea (superelevation): 4"
- Maximum $E_{u\ pas}$ (unbalance passenger): 3"
- Maximum $E_{u\ Frt}$ (unbalance freight): 2"
- Maximum superelevation runoff: 1" in 62'
- Minimum tangent length between curves: 100'
- Minimum spiral length is determined by the maximum value calculated with both equations 1 and 2. If the curve length calculated by equation 1 would result in excessive construction costs, equation 1 can be substituted by equation 3. In which case the minimum length of spiral will be determined by the maximum length calculated by both formulas 2 and 3.
  - $L = 1.63(E_u)V$ (eqn. 1)
    - Where: L = minimum desirable length of spiral in feet for new construction or where the cost of realignment is not excessive.
      E_u = unbalanced elevation in inches (2" for passenger)
      V = maximum train speed in mph
  - $L = 62\ E_a$ (eqn. 2)
    - Where: L = minimum desirable length of spiral in feet
      E_a = actual superelevation in inches
  - $L = 1.22(Eu)V$ (eqn. 3)
    - Where: L = minimum desirable length of spiral in feet for existing construction where realignment would result in excessive costs.
      E_u = unbalanced elevation in inches (2" for passenger)
      V = maximum train speed in mph

Vertical Alignment Criteria:

- Vertical Curves
  - Minimum length of a vertical curve for both sags and summits is determined by the following formula. In no case shall the length of vertical curve be less than 100'. In the case of mixed passenger and freight operations the maximum length as calculated for freight and passenger
  - $L = (D \times V^2 \times 2.15)/A$

    Where: L = Minimum length of vertical curve in feet

    D = Absolute value of the difference in rates of grades expressed as a decimal

    V = Speed of the train in miles per hour

    A = Vertical acceleration in feet/sec/sec (ft/sec2)

    For passenger operations A = 0.60 feet/sec/sec.

    For freight operations A = 0.10 feet/sec/sec.
  - Minimum distance between vertical curves is not less than 100'
  - Maximum grade 2%

Turnouts:

- Minimum mainline turnout size: #10

Clearances:

- 22' vertical clearance desired for new construction, if feasible.
- Existing minimum vertical clearance on Rockland Branch: 17' 6" (Winter St. bridge)
- Horizontal clearance: 8 feet from centerline of track.

HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005 **Date:** January 26 2004

From: Paul Godfrey

Subject: Maine DOT - Bath Feasibility Study
MDOT PIN # 10123.00
Traffic Data Collection

Purpose

The purpose of this memorandum is to document the traffic data collection efforts in support of the Baseline Traffic Conditions analysis for the Bath Feasibility Study. The memorandum will (1) document the types of data gathered, (2) describe the manner in which the data was collected, and (3) summarize all data collected during this process.

Traffic Study Area Overview

The City of Bath is located on the west bank of the Kennebec River with a population of approximately 9,300 people. The primary roadway in the City of Bath and the Traffic Study Area is US Route 1 ("Route 1"), which runs in an east-west direction through the middle of the City of Bath. The eastern portion of Route 1 is elevated. This portion, known as the "viaduct", begins at High St. and extends eastward for ½ mile to the Sagadahoc Bridge. The downtown portion of the City of Bath lies primarily north of the viaduct. Figure 1 on the following page provides an overview of the Traffic Study Area.

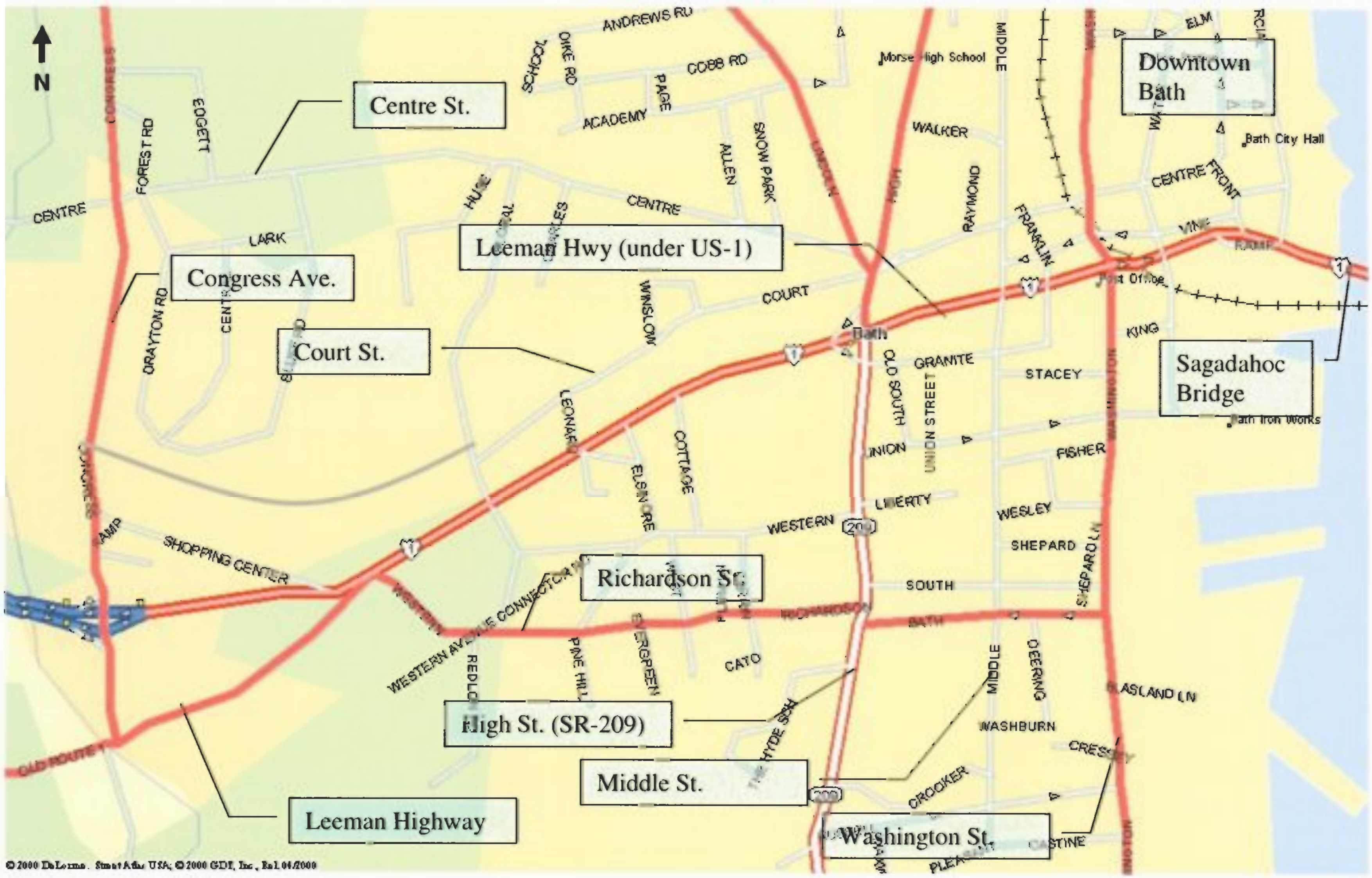
The northern and southern halves of the City of Bath are linked by four primary north-south roadways. These roads are described below:

- **Congress Ave.** is located about one mile west of the downtown area, and serves primarily as an access road to Route 1 and to the shopping center.
- **High St.** (State Route 209) carries the highest traffic volumes of north-south roadways. It connects the City of Bath with Phippsburg and other coastal communities to the south.
- **Middle St.** carries the lowest volumes of the four north-south roadways. It runs through a residential neighborhood south of the viaduct.
- **Washington St.** runs parallel to the Kennebec River on the east side of the City of Bath. It provides access to and serves as a connector to Bath Iron Works (BIW) to the south.

The majority of traffic uses Route 1 through the City of Bath and the Traffic Study Area. However, there are four local roads that support east-west travel within the Traffic Study Area. These roads are described below:

- **Centre St.** is the northernmost roadway. The longest of the east-west roadways, Centre St. begins just west of Congress Ave. and extends eastward to Front Street.
- **Court St.** begins at Floral St. and runs eastward to High St, where it merges with Centre St. This road provides local access to the shopping center area.
- **Richardson St** originates east of Congress Ave and extends to High St. This road is frequented by commuters from west of the City of Bath seeking a local connection to BIW.
- **Leeman Hwy.** runs directly under the viaduct, thus serving as a frontage road for Route 1. It begins west of Congress Avenue and extends eastward to the Sagadahoc Bridge.

Figure 1 – Traffic Study Area



Data Collection Overview

There are two primary contributors to traffic flow in and through the City of Bath. The first contributor is Bath Iron Works (BIW). With current employment of about 7000 people (2003), BIW is by far the dominant employer in the region. Traffic in the vicinity of BIW surges during the periods just prior to the start of the first shift (i.e. 6:30-7:00am) and just after the end of the first shift (i.e. 3:30-4:00pm).

The second contributor to regional traffic is summer tourism. Through traffic on Route 1 increases dramatically during the months of July and August, as tourists stream up the coast on their way to various vacation destinations. State Route 209 (SR-209, or High St.) also experiences a jump in summer traffic, since it connects Route 1 to tourist-related destinations south of the City of Bath. These destinations include Phippsburg, Popham Beach State Park, and Hermit's Island.

In order to capture the combined impact of summer-related and work-related traffic, the Study Team collected traffic data during the month of August 2002. During this month, four different types of data were gathered: pedestrian counts, turning movement counts, automatic traffic recorder (ATR) counts, and license plate counts. The sections that follow will provide a more detailed description of the data collection process.

Pedestrian Counts

Pedestrian counts were conducted at five intersections throughout the Traffic Study Area, as depicted on Figure 2, page 4 of 25. Pedestrian counts were performed at key intersections in the downtown area and along High Street at locations where routine pedestrian movements were observed. Pedestrian counts were conducted in conjunction with AM and PM peak turning movement counts. Table 1 below identifies pedestrian count locations and total pedestrians volumes.

Table1 – Overview of Pedestrian Count Locations

Location	AM Peak		PM Peak	
	Time	Total Peds	Time	Total Peds
High St. @ US-1 WB On-Ramp	7:15-8:15	6	3:00-4:00	28
High St. @ US-1 EB Off-Ramp	7:30-8:30	3	4:30-5:30	33
Leeman Hwy @ Washington St.	6:30-7:30	25	3:30-4:30	93
Leeman Hwy @ Middle St.	6:30-7:30	13	4:30-5:30	13
Leeman Hwy @ Water St.	6:30-7:30	70	3:30-4:30	62

TURNING MOVEMENT COUNTS

Turning movement counts were conducted at 17 intersections throughout the Traffic Study Area. Counts were performed on Tuesdays, Wednesdays, and Thursdays, and were timed in order to capture peak traffic flows into and out of BIW. Morning counts were conducted from 6:30-8:30am, while evening counts were conducted from 3-6pm. Each count segregated vehicles into three different categories: cars, single-unit trucks, and combination trucks.[1]

Figure 2 and 3, pages 4 and 5 of 27 on the following page illustrates the intersections at which turning movement counts were collected. Data summaries are contained in Appendix C.

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[1] The breakdown was based on FHWA's Vehicle Classification scheme. "Cars" represented vehicle types 1-3, "single-unit trucks" represented vehicle types 4-7, and "combination trucks" represented vehicle types 8-13.

Figure 2– Overview of Turning Movement Locations(Map 1 of 2)

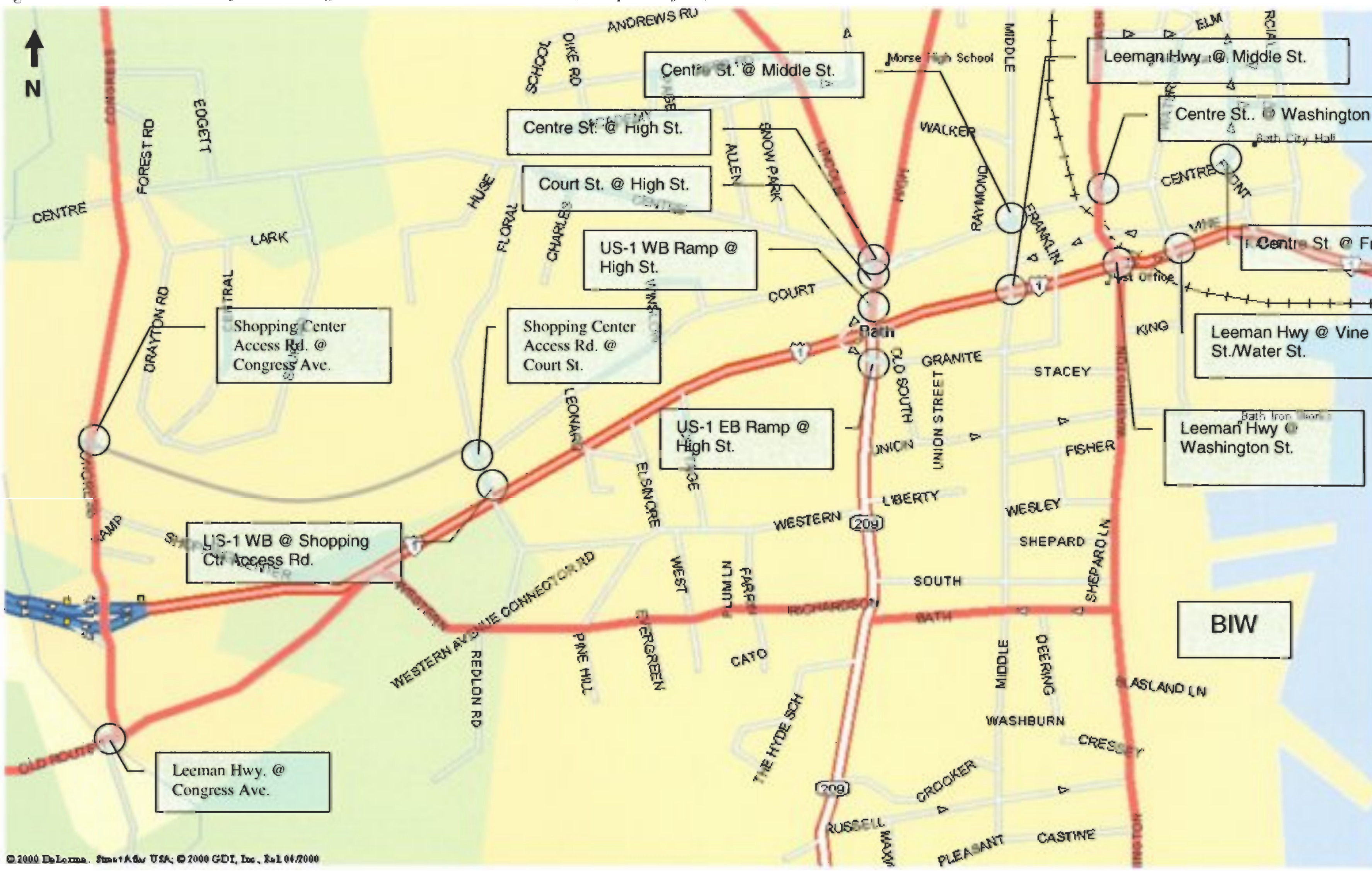


Figure 3– Overview of Turning Movement Locations(Map 2 of 2)

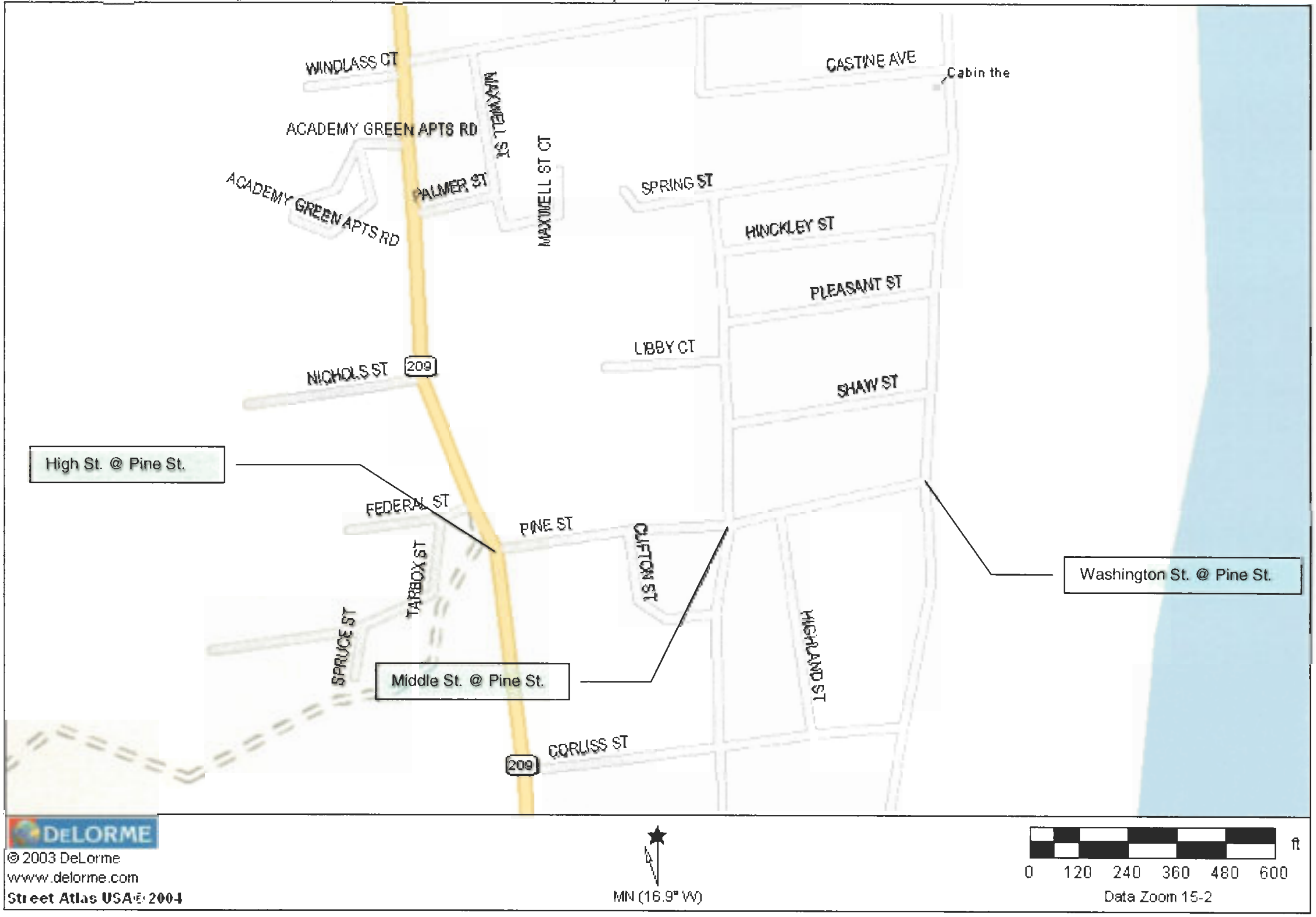


Table 2 provides an overview of the results of the turning movement counts. For each location, the volume of traffic entering the intersection during the peak hour is documented, as is the time of the peak hour and the peak hour factor (PHF)[2]. This information is presented for both the AM and PM peak hours. The locations in bold print represent the two signalized intersections in the Traffic Study Area.

Table 2 – Turning Movement Count Summary

Location	AM Peak			PM Peak		
	Time	Total Entering Traffic	PHF	Time	Total Entering Traffic	PHF
Shopping Ctr Access Rd. @ US-1 WB	7:00-8:00	1265	0.99	3:00-4:00	2131	0.79
Shopping Ctr Access Rd. @ Court St.	7:30-8:30	301	0.90	4:15-5:15	674	0.94
Congress Ave. @ Shopping Ctr Access Rd.	7:30-8:30	787	0.94	3:45-4:45	1315	0.97
Congress Ave. @ Leeman Hwy	7:15-8:15	784	0.97	3:30-4:30	1470	0.83
High St. @ Centre St.	7:30-8:30	512	0.93	3:45-4:45	951	0.94
High St. @ Court St.	7:30-8:30	503	0.96	3:45-4:45	1001	0.97
High St. @ US-1 WB On-Ramp	7:30-8:30	606	0.89	3:15-4:15	1122	0.83
High St. @ US-1 EB Off-Ramp	6:30-7:30	752	0.76	3:15-4:15	1224	0.82
High St. @ Pine St. / Tarbox Rd.	7:30-8:30	534	0.92	3:30-4:30	957	0.79
Middle St. @ Pine St.	6:30-7:30	121	0.52	3:00-4:00	249	0.51
Washington St. @ Pine St.	7:30-8:30	190	0.79	3:15-4:15	413	0.70
Washington St. @ Leeman Hwy	**6:30-7:30**	**1188**	**0.74**	**3:30-4:30**	**1838**	**0.87**
Washington St. @ Centre St.	**7:30-8:30**	**554**	**0.93**	**3:00-4:00**	**1003**	**0.90**
Front St. @ Centre St.	7:30-8:30	237	0.88	3:00-4:00	443	0.87
Middle St. @ Centre St.	7:30-8:30	374	0.91	3:15-4:15	818	0.84
Leeman Hwy @ Middle St.	6:30-7:30	805	0.72	3:15-4:15	1155	0.73
Water St. @ Leeman Hwy / Vine St.	6:30-7:30	0	0.00	6:30-7:30	0	0.00

Four important observations may be drawn from Table 2:

- The timing of the peak hour is not consistent throughout the Study Area. This indicates that factors other than BIW commuter traffic contribute to peak-hour volumes.
- Nevertheless, BIW is clearly the dominant factor. This is evidenced by the fact that most intersections begin their evening peak hour either just before or just after the end of BIW's first shift at 3:30pm.
- Further evidence of BIW's influence on regional traffic can be found in examining the peak hour factors. In the AM peak, 8 of the 17 intersections have peak hour factors of 0.90 or below; this number jumps to 11 of 17 in the PM peak. These unusually low peak hour factors reflect the surges in traffic just prior to the beginning and just after the ending of the first shift.
- Evening peak-hour traffic is about 70% higher (on average) than morning peak-hour traffic. This may be attributed to the presence of recreational trips in the PM peak—trips that were not present during the early morning rush hour.

A detailed summary of the peak-hour traffic flows at each intersection is found in Appendix A, page 15 of 27.

[2] Peak Hour Factor (PHF) is defined as the ratio of total hourly volume to 4 times the peak 15 min. flow rate within the hour.

Automatic Traffic Recorder Data
In order to provide information during off-peak traffic periods, the Study Team performed Automatic Traffic Recorder (ATR) counts at 38 different locations within the Traffic Study Area. Table 3 provides a summary of the locations at which ATR counts were conducted. Data summaries are provided in Appendix D.

Table 3 – Summary of ATR Locations

Street	Location	Direction	Type	Start Date	Finish Date
Centre St.	E. of Middle St.	EB & WB	Volume	Wed, 08-21-02	Sun, 08-25-02
Centre St.	W. of Middle St.	EB & WB	Volume	Wed, 08-14-02	Sun, 08-18-02
Commercial St.	N. of Lambard St.	NB & SB	Volume	Sat, 08-17-02	Wed, 08-21-02
Congress Ave.	S. of US-1	NB & SB	Volume	Wed, 08-21-02	Sun, 08-25-02
Court St.	W. of High St.	EB & WB	Volume	Wed, 08-14-02	Sun, 08-18-02
Front St.	N. of Centre St.	NB Only	Volume	Wed, 08-21-02	Sun, 08-25-02
High St.	N. of Union St.	NB & SB	Volume	Wed, 08-21-02	Sun, 08-25-02
High St.	N. of Centre St.	NB & SB	Volume	Wed, 08-14-02	Sun, 08-18-02
High St.	S. of Pine St.	NB & SB	Volume	Sun, 08-18-02	Wed, 08-21-02
High St.	S. of Court St.	NB & SB	Volume	Sun, 08-18-02	Wed, 08-21-02
High St.	S. of Pine St.	NB & SB	Class	Wed, 08-21-02	Wed, 08-28-02
Leeman Hwy	W. of Congress Ave.	EB & WB	Volume	Sat, 08-24-02	Wed, 08-28-02
Leeman Hwy	W. of Middle St.	EB & WB	Volume	Sat, 08-10-02	Wed, 08-14-02
Middle St.	S. of School St.	NB & SB	Volume	Sat, 08-10-02	Wed, 08-14-02
Middle St.	S. of Stacy St.	NB & SB	Volume	Sat, 08-10-02	Wed, 08-14-02
Middle St.	N. of Pine St.	NB & SB	Volume	Sun, 08-18-02	Wed, 08-21-02
Union St.	W. of Middle St.	EB Only	Volume	Sun, 08-18-02	Wed, 08-21-02
US-1 EB	Sagadahoc Bridge	EB Only	Class	Wed, 09-18-02	Sun, 09-22-02
US-1 EB	E. of High St.	EB Only	Class	Wed, 08-28-02	Sun, 09-01-02
US-1 EB	W. of Congress Ave. Ramps	EB Only	Class	Wed, 08-21-02	Sun, 08-25-02
US-1 EB	W. of Western Ave.	EB Only	Volume	Sun, 08-25-02	Wed, 08-28-02
US-1 EB On-Ramp	to Sagadahoc Bridge	EB Only	Volume	Wed, 08-28-02	Sun, 09-01-02
US-1 EB Off-Ramp	W. of High St.	EB Only	Volume	Wed, 08-21-02	Sun, 08-25-02
US-1 WB	W. of Congress Ave.	WB Only	Class	Wed, 08-21-02	Sun, 08-25-02
US-1 WB	Sagadahoc Bridge	WB Only	Class	Wed, 08-28-02	Sun, 09-01-02
US-1 WB	E. of High St.	WB Only	Class	Sun, 08-25-02	Wed, 08-28-02
US-1 WB On-Ramp	W. of Congress Ave.	WB Only	Volume	Wed, 08-21-02	Sun, 08-25-02
US-1 WB On-Ramp	W. of High St.	WB Only	Volume	Sun, 08-18-02	Wed, 08-21-02
US-1 WB Off-Ramp	E. of Congress Ave.	WB Only	Volume	Wed, 08-21-02	Sun, 08-25-02
US-1 WB Off-Ramp	from Sagadahoc Bridge	WB Only	Volume	Wed, 08-28-02	Sun, 09-01-02
Vine St.	E. of Water St.	EB & WB	Volume	Wed, 08-14-02	Sun, 08-18-02
Washington St.	N. of Centre St.	NB & SB	Volume	Wed, 08-14-02	Sun, 08-18-02
Washington St.	N. of King St.	NB & SB	Volume	Sat, 08-10-02	Wed, 08-14-02
Washington St.	N. of King St.	SB Only	Volume	Sat, 08-10-02	Wed, 08-14-02
Washington St.	S. of Pine St.	NB & SB	Volume	Sun, 08-18-02	Wed, 08-21-02
Washington St.	S. of Centre St.	NB & SB	Volume	Wed, 08-14-02	Sun, 08-18-02
Water St.	N. of King St.	NB & SB	Volume	Sat, 08-10-02	Wed, 08-14-02
Water St.	N. of US-1	SB Only	Volume	Sat, 08-10-02	Wed, 08-14-02
Western Ave.	W. of Elsinor St.	EB & WB	Volume	Sun, 08-18-02	Wed, 08-21-02

As Table 3, page 6 of 27 illustrates, the Study Team performed two different types of counts. The first type was a volume count, which simply records the number of vehicles passing over the roadway in a particular direction. The second type was a classification count, in which each vehicle is both counted and classified according to its FHWA vehicle type.

Each count was performed over a three to four day period. Each period included at least two weekdays (Monday through Friday) and 1 weekend day (Saturday-Sunday). In general, the counts were either performed between Wednesday morning and Sunday morning (a 96-hour count), or between Sunday morning and Wednesday morning (a 72-hour count). The intent of this approach was to capture the impact of both commuting traffic (occurring primarily on weekdays) and tourist traffic (occurring primarily on weekends).

Once all the ATR data was collected and compile, the Study Team developed three different volumes for each location:

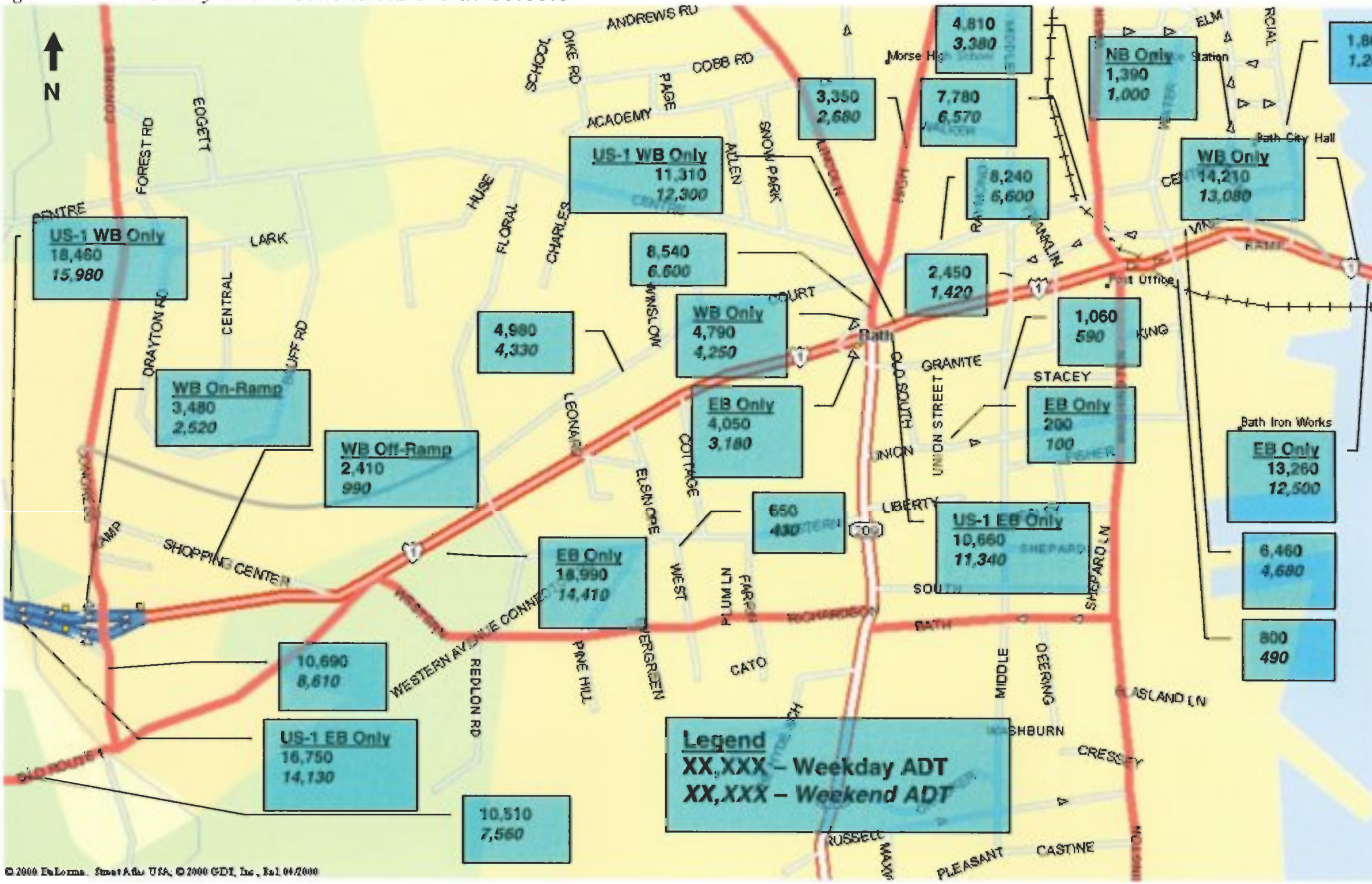
- Weekday average daily traffic (ADT), including Fridays;
- Weekday ADT, excluding Fridays; and
- Weekend ADT.

Because many locations were not counted on Friday, the "Weekday ADT, excluding Fridays" count provided the best basis of comparison for weekday traffic. Therefore, all weekday ADT's reported in this memorandum will exclude the influence of Friday traffic.

Figure 4, page 8 of 27, summarizes the weekday and weekend ADT's on selected roadways in the study area. Unless noted otherwise, each volume represents a two-way total, rounded to the nearest 10 vehicles. The bold-faced numbers represent weekday ADT, while the italicized numbers represent weekend ADT.[3]

[3] The Route 1 eastbound volume on the Sagadahoc Bridge was the only data point that was collected outside of the month of August. The original road tube used to monitor this location in August was torn up, forcing the site to be postponed until September. As a result, the raw data at this point is slightly lower than one would expect during August.

Figure 4 – Weekday and Weekend ADT's at Selected Locations



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Reference: Table 3 – Summary of ATR Locations, page 6 of 25

As indicated in Table 3, page 6 of 27 the Study Team gathered vehicle classification data at four different locations throughout the Study Area. In order to maximize accuracy of the data, the Study Team chose locations that were located on straight-aways, where vehicles tended to maintain a constant speed and where stop-and-go movement was rarely (if ever) experienced. Most of these locations were on Route 1; one location, however, was located on SR-209 (High St.) south of the City of Bath.

Table 4 summarizes the classification count data. The column labeled "cars" represents FHWA classes 1 through 3; "single-unit trucks" represents FHWA classes 4 through 7; and "combination trucks" represents classes 8 through 13.

Table 4 – Classification Count Summary

Location	Direction	Cars	Single-Unit Trucks	Combination Trucks
Rte. 1 West of Congress Ave.	EB	91.7%	3.4%	4.9%
	WB	90.2%	3.6%	6.2%
Viaduct	EB	95.3%	3.0%	1.7%
	WB	94.9%	3.1%	2.0%
Sagadahoc Bridge	EB	91.4%	3.7%	5.0%
	WB	91.7%	3.7%	4.6%
High St. south of Pine St.	NB	94.4%	2.5%	3.1%
	SB	89.3%	7.0%	3.7%
	Average:	**92.4%**	**3.7%**	**3.9%**

Table 4 indicates that "cars" (that is, motorcycles, passenger cars, pickup trucks, and SUV's) comprise over 90% of the total vehicles. The remaining 8% of the vehicles are evenly divided between single-unit trucks and combination trucks.

ORIGIN-DESTINATION (O&D) SURVEY

As noted earlier in the memorandum, BIW is a dominant contributor to traffic flow during the peak hour. For most intersections in the City of Bath, the timing of the peak hour coincides roughly with the timing of the first BIW shift. The Traffic Study Area experiences a traffic surge just prior to the beginning of the shift and just after the end of the shift.

It is reported that a common occurrence is the use of the local road network to access BIW. In order to identify the volume of BIW related traffic on local roads, an origin-destination (O&D) survey was performed. The Study Team conducted an O&D by tracking license plates as a means of tracing certain trips through the City of Bath road network.

The survey was used to quantify the following:

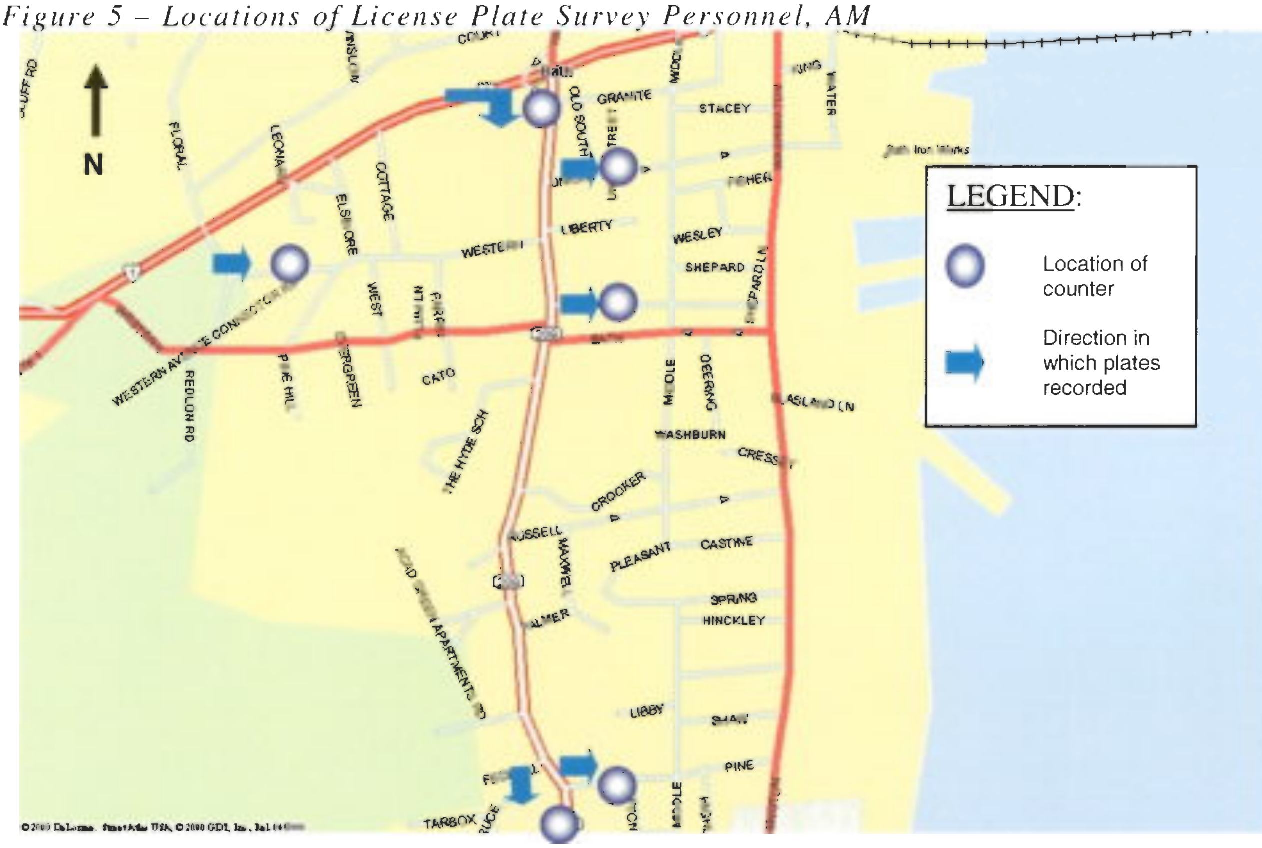
- Number of eastbound commuters on Route 1 using the local network to get to BIW in the morning, and
- Number of westbound commuters using the local network to get from BIW to Route1 westbound in the evening

In order to quantify the above, the Study Team conducted a simple form of origin-destination study known as a license plate survey. The study was performed on September 5th, 2002. Eastbound traffic was surveyed from 6:15-7:15 AM, while westbound traffic was surveyed from 3:00-4:00 PM. The following discusses the manner in which the study was conducted and summarizes the results of the study.

Morning Survey – 6:15-7:15 AM

1. Six people were stationed at selected locations throughout the City of Bath, as identified on Figure 5 below. The locations include Western Avenue, High Street and Granite Street, Union Street, Pine Street, and South Street.

Figure 5 – Locations of License Plate Survey Personnel, AM

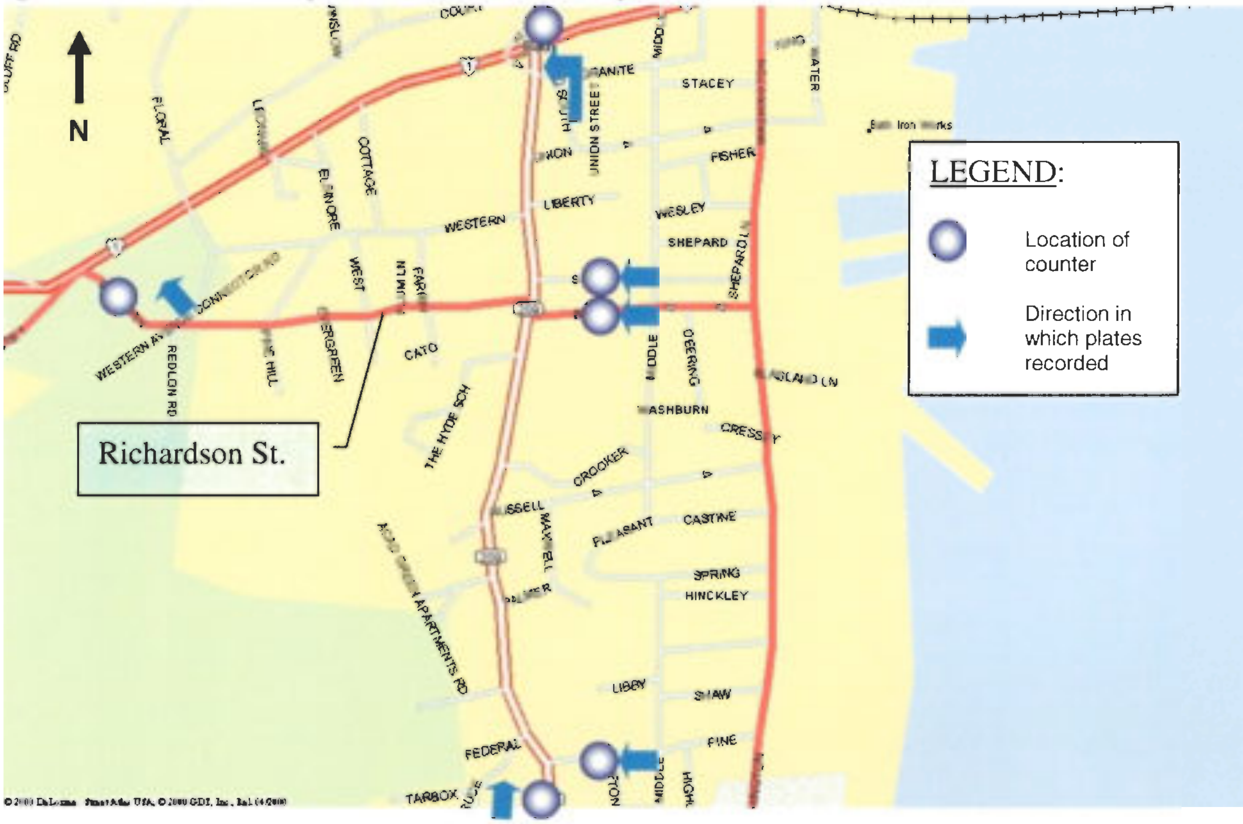


2. Beginning at 6:15am, each person recorded the license plate number of all passing vehicles. The direction in which plate numbers were recorded is identified in Figure 4.
3. The license plate numbers of the vehicles "entering" the system at Western Ave. and at the High St. ramp were compared with the license plate numbers of the vehicles "exiting" the system at the other four locations. The numbers recorded at Union St., South St., and Pine St. captured the vehicles destined for BIW; the numbers recorded at High St. (south of Pine St.) captured the vehicles that simply passed through the system.

Evening Survey – 3:00-4:00 PM

1. Due to observed traffic levels, a decision was made to gather data from Richardson St. in the evening, rather than from Western Ave.
2. Once again, six recorders were positioned at selected locations. The locations were the following: Richardson St, High St WB ramp, South St, Bath St, High St south of Pine St. These locations are identified in Figure 6 below. (The two streets whose names are hidden are South St. and Bath St.)

Figure 6 – Locations of License Plate Survey Personnel, PM



3. Beginning at 4:00pm, each person recorded the license plate number of all passing vehicles. The direction in which plate numbers were recorded is identified in Figure 5.
4. The license plate numbers of the vehicles "entering" the system at South St., Bath St., Pine St., and High St. were compared to the license plate numbers of the vehicles "exiting" the system at Richardson St. and at the High St. WB ramp. The vehicles entering the system at South, Bath, and Pine Streets represented vehicles originating from BIW; the vehicles entering the system at High St. represented non-BIW vehicles.

A detailed summary of the O&D survey results can be found in Appendix B, page 24 of 27.

<u>Crash Data</u>
MDOT's Traffic Engineering Division summarizes all reported crashes in which there is property damage in excess of $500, or in which there has been personal injury. In order to summarize this information, the MDOT has established a Node and Link System. This system assigns a four-digit node number to each intersection, major bridge, railroad crossing, and crossing of town, county or urban compact lines. The segments of road that connect the nodes are referred to as links. As crash reports are received by MDOT, the information is assigned to the corresponding link or node at which they occurred.

If a particular link or node meets certain criteria, then the MDOT classifies it as a high-crash location (HCL). These criteria are:

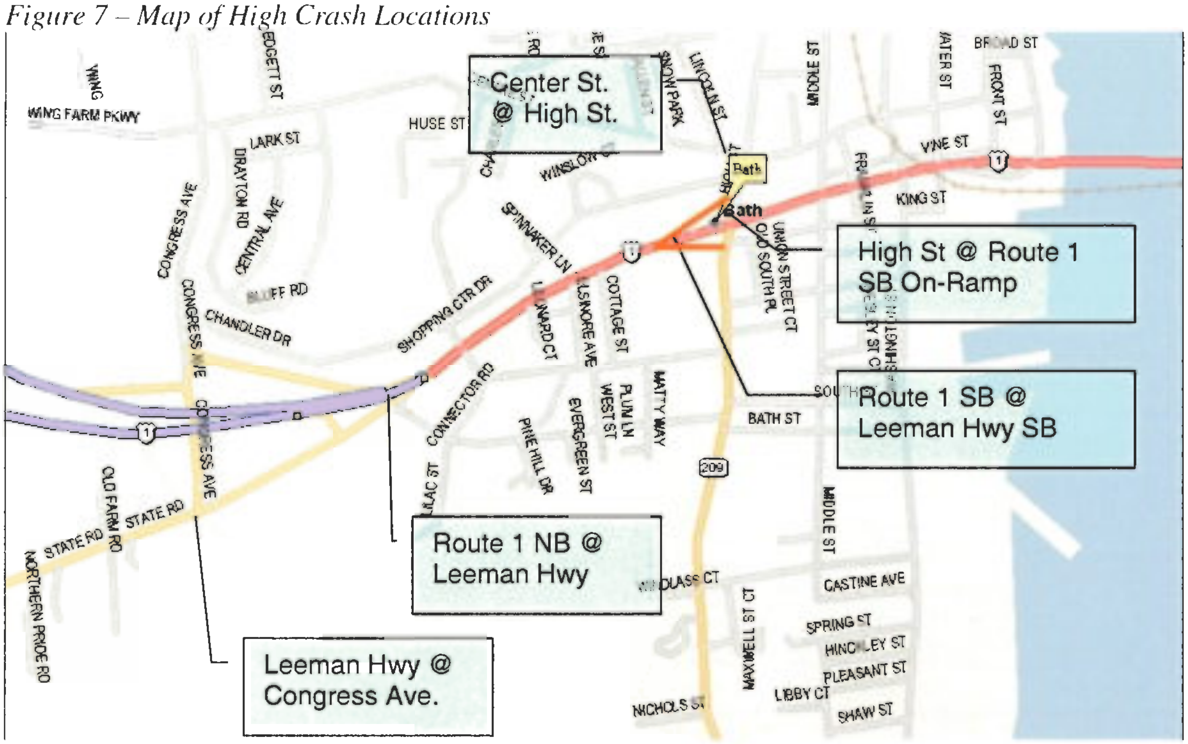
The link or node must have 8 or more reported crashes over the past 3 years, <u>and</u> the link or node must have a "critical rate factor" (CRF) over 1.00. (The critical rate factor relates the crash rate at a particular link or node to the statewide crash rate average for a similar type of facility).

Crash data for key links and nodes in the Study Area were obtained and reviewed for the most recent three-year period for which data was available (2000-2002). Table 5 summarizes the HCL crash data and Figure 7 identifies the HCL's within the Study Area.

Table 5 – Study Area High Crash Locations

Node (Intersection) Name	Total # of Crashes (2000-2002)	Critical Rate Factor (CRF)	MDOT Node Number
Leeman Highway at Congress Ave.	10	1.34	4331
Route 1 NB at Leeman Highway	19	3.79	7020
Center Street at High Street	15	2.39	7112
High Street at Route 1 SB On-Ramp	10	1.61	7379
Route 1 SB at Leeman/SB On-Ramp	65	15.03	8987

Figure 7 – Map of High Crash Locations



Other Relevant Traffic Data

During the data collection process, a number of surface parking lots were identified in and around BIW. The Study Team identified each of these lots and counted the number of available and occupied spaces for each.

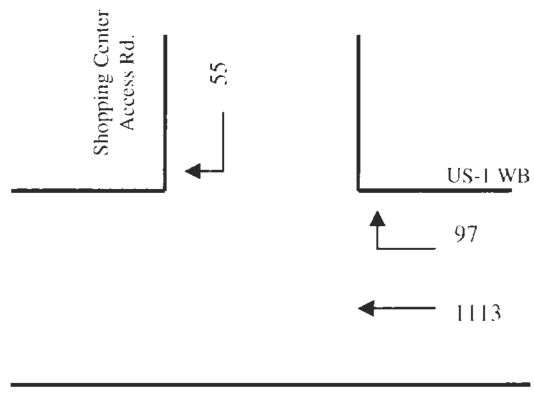
Table 6 on page 13 of 27 identifies the surface parking lot data collected.

Table 6 – Inventory of Surface Lots

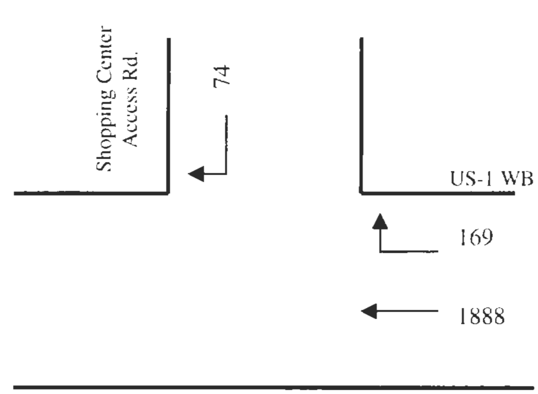
Lot #	# of Parking Spaces	# of Cars	Surface Conditions	Comments:
1	18	17	Gravel	
2	18	16	Gravel	
3	15	13	Gravel	
4	24	20	Gravel	
5	20	19	Gravel	
6	64	53	Asphalt	
7	24	21	Asphalt	
8	20	17	Gravel	
9	23	14	Asphalt	Assigned Parking space by name
10	41	35	Asphalt	Assigned Parking space by name
11	56	24	Gravel	
12	127	125	Gravel	
13	37	36	Asphalt	Controlled Access Navy Parking
14	128	77	Asphalt	Controlled Access Navy Parking
15	241	211	Asphalt	
16	28	20	Gravel	
17	42	39	Asphalt	
18	21	20	Gravel	
19	51	51	Gravel	
20	50	50	Gravel	
21	76	69	Asphalt	
22	34	34	Gravel	
23	30	30	Gravel	Subship parking
24	16	18	Asphalt	
25	31	24	Asphalt	
26	24	24	Asphalt	
27	13	11	Gravel	Sign reads "Not BIW Parking"
28	36	36	Asphalt	
29	61	60	Asphalt	
30	37	37	Asphalt	
31	24	16	Asphalt	Doesn't appear to be BIW parking
32	72	45	Asphalt	Doesn't appear to be BIW parking
Total	**1502**	**1282**		**85% Occupancy Rate**

Appendix A – Turning Movement Count Summary

Figure A-1 - Shopping Center Access Rd. @ US-1 WB

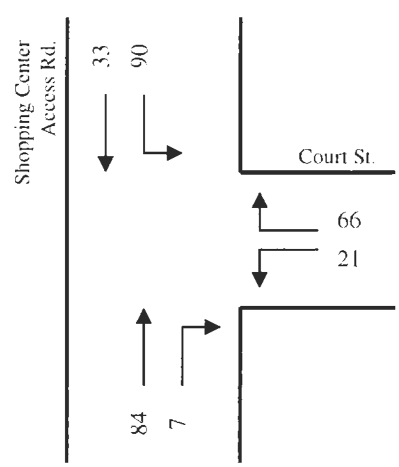


AM Peak Hour – August 2002
7:00 – 8:00 AM
PHF = 0.99

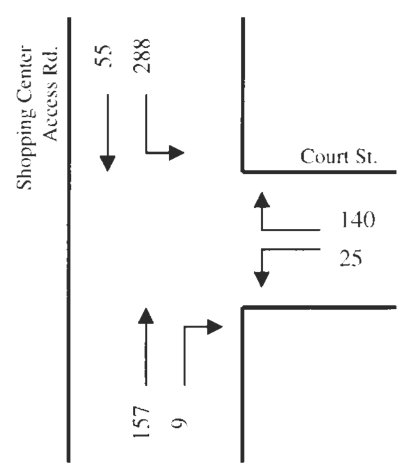


PM Peak Hour- August 2002
3:00 – 4:00 PM
PHF = 0.79

Figure A-2: Shopping Center Access Rd. @ Court St.



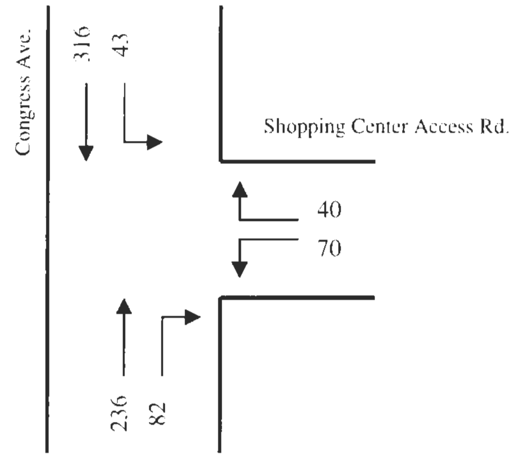
AM Peak Hour – August 2002
7:30 – 8:30 AM
PHF = 0.90



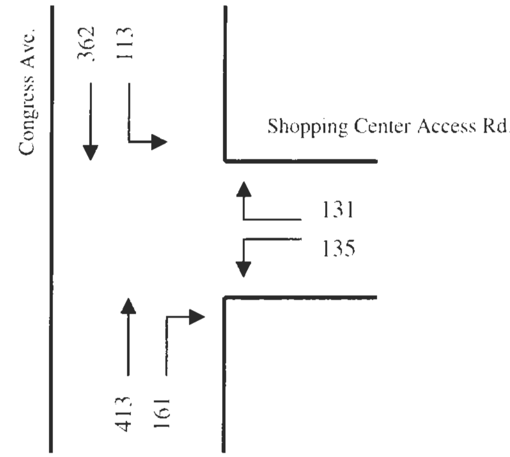
PM Peak Hour – August 2002
4:15 – 5:15 PM
PHF = 0.94

PHF = Peak Hour Factor

Figure A-3 – Congress Ave. @ Shopping Center Access Rd.

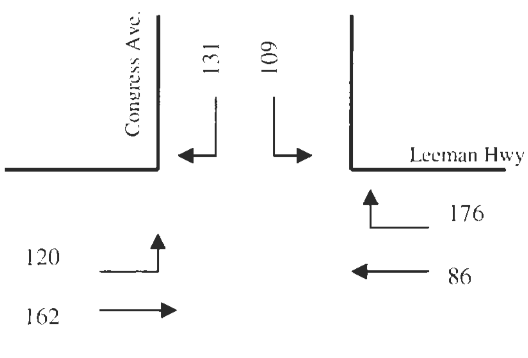


AM Peak Hour – August 2002
7:30 – 8:30 AM
PHF = 0.94

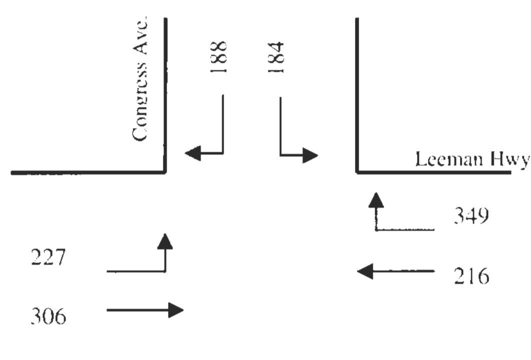


PM Peak Hour – August 2002
3:45 – 4:45 PM
PHF = 0.97

Figure A-4 – Congress Ave. @ Leeman Hwy (Old Route 1)



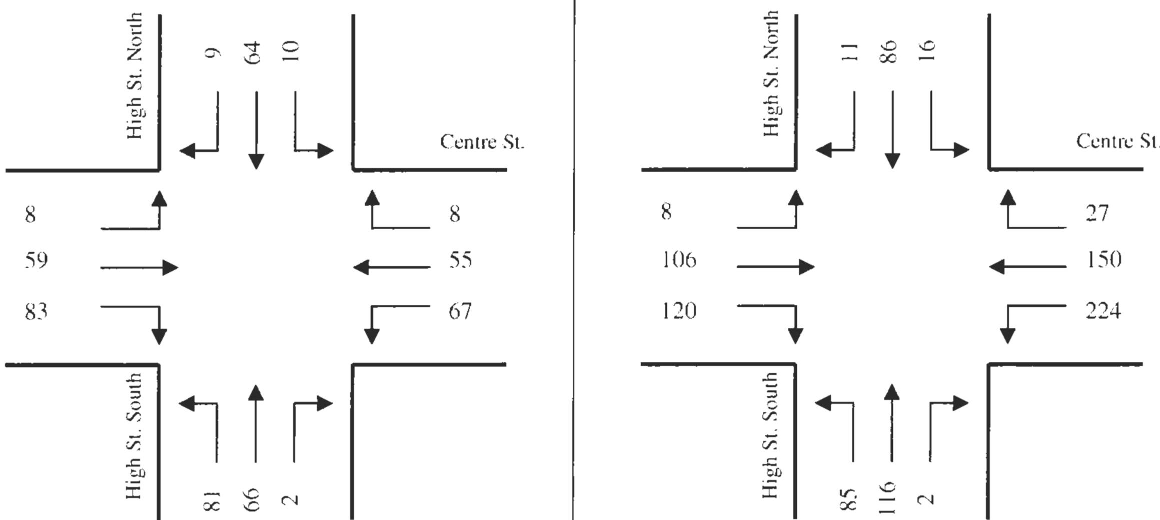
AM Peak Hour – August 2002
7:15 – 8:15 AM
PHF = 0.97



PM Peak Hour – August 2002
3:30 – 4:30 PM
PHF = 0.83

PHF = Peak Hour Factor

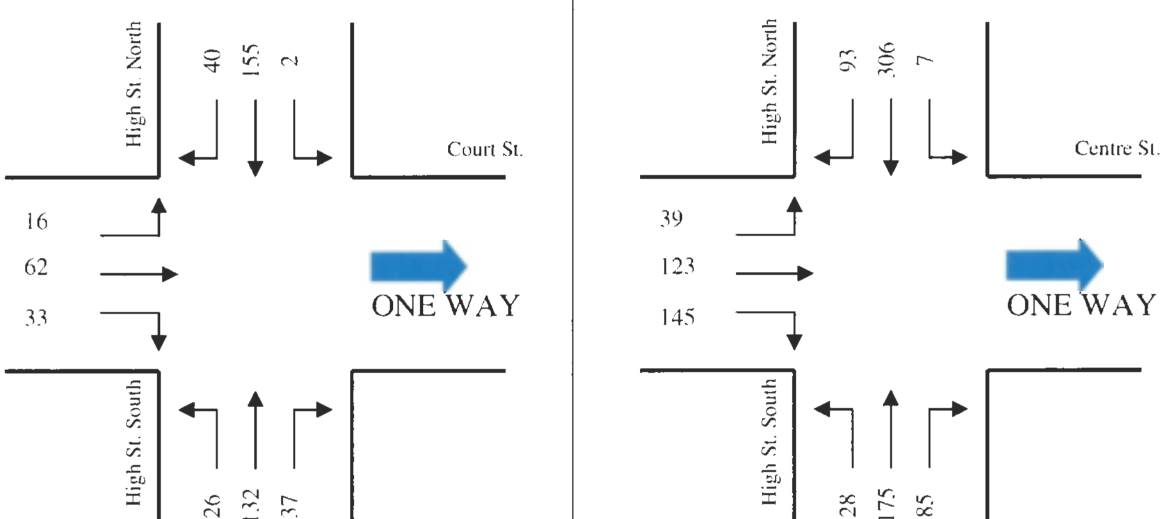
Figure A-5 – High St. @ Centre St.



AM Peak Hour – August 2002
7:30 – 8:30 AM
PHF = 0.93

PM Peak Hour – August 2002
3:45 – 4:45 PM
PHF = 0.94

Figure A-6 – High St. @ Court St.

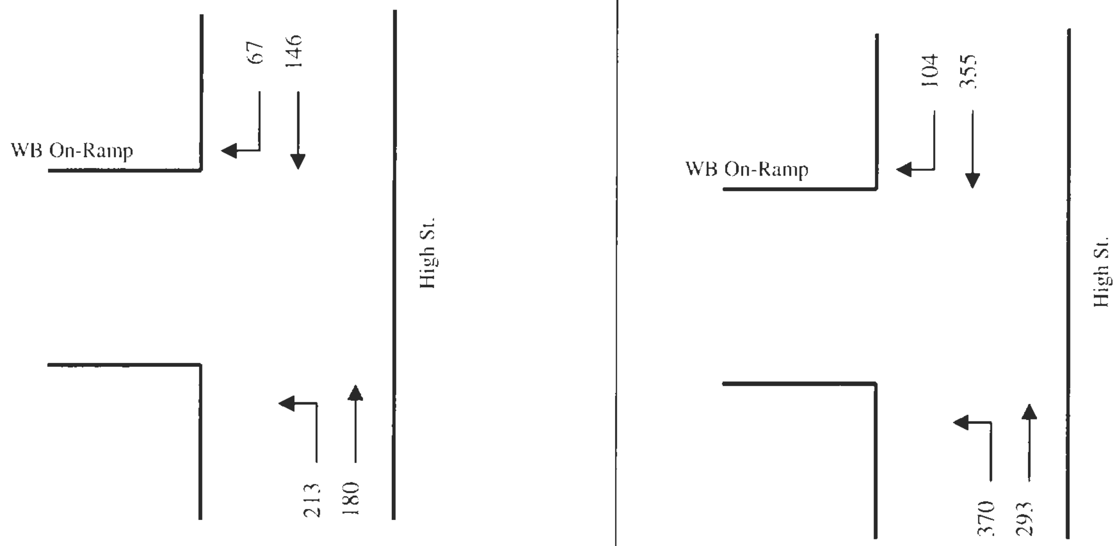


AM Peak Hour – August 2002
7:30 – 8:30 AM
PHF = 0.96

PM Peak Hour – August 2002
3:45 – 4:45 PM
PHF = 0.97

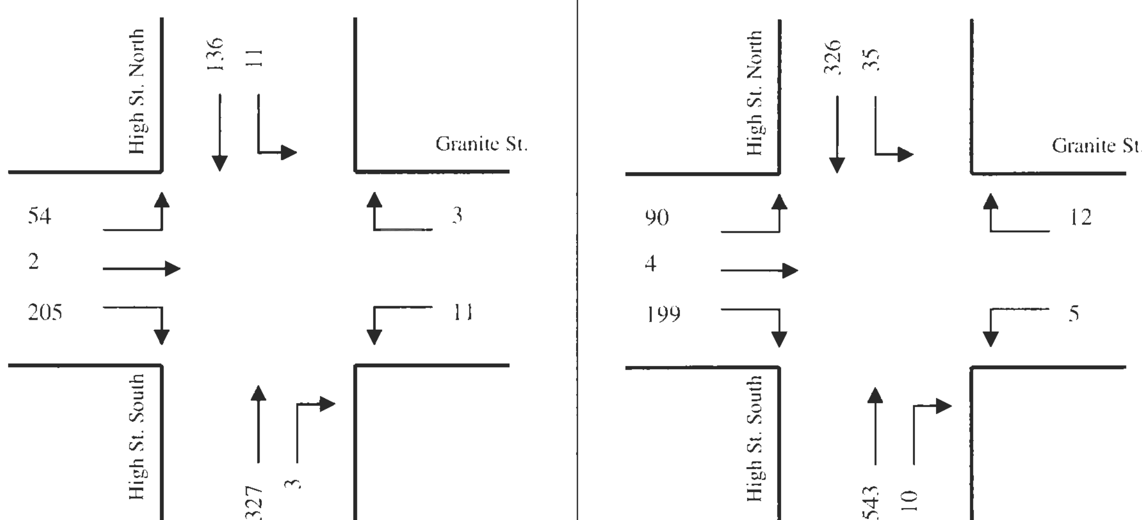
PHF = Peak Hour Factor

Figure A-7 – High St. @ WB On-Ramp to US-1



AM Peak Hour – August 2002	PM Peak Hour – August 2002
7:30 – 8:30 AM	3:45 – 4:45 PM
PHF = 0.89	PHF = 0.83

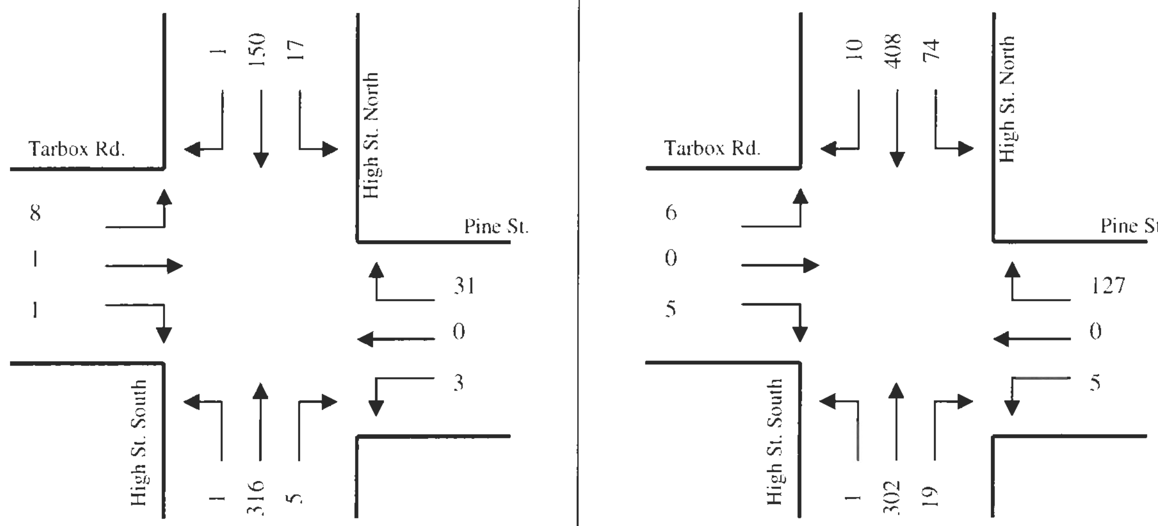
Figure A-8 – High St. @ EB Off-Ramp from US-1



AM Peak Hour – August 2002	PM Peak Hour – August 2002
6:30 – 7:30 AM	3:15 – 4:15 PM
PHF = 0.76	PHF = 0.82

PHF = Peak Hour Factor

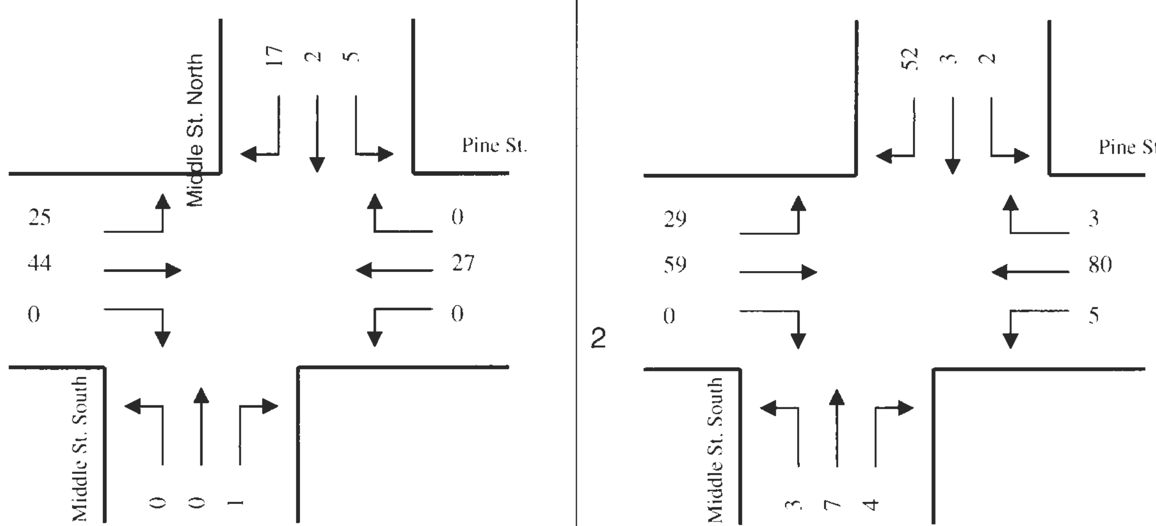
Figure A-9 – High St. @ Pine St. / Tarbox Rd.



AM Peak Hour – August 2002
7:30 – 8:30 AM
PHF = 0.92

PM Peak Hour – August 2002
3:30 – 4:30 PM
PHF = 0.79

Figure A-10 – Middle St. @ Pine St.

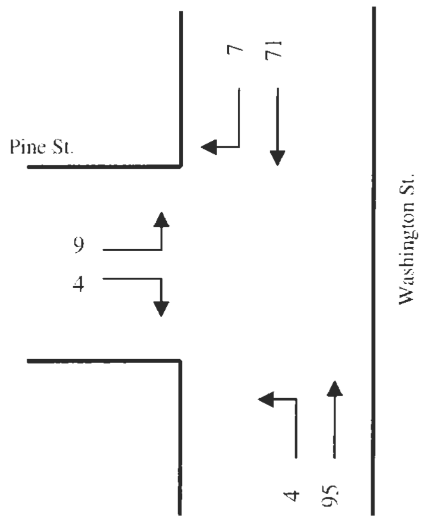


AM Peak Hour – August 2002
6:30 – 7:30 AM
PHF = 0.52

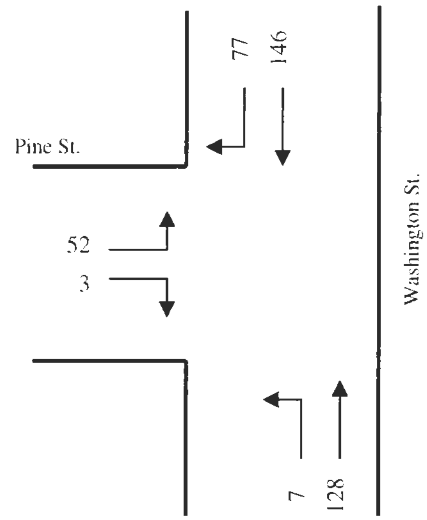
PM Peak Hour – August 2002
3:00 – 4:00 PM
PHF = 0.51

PHF = Peak Hour Factor

Figure A-11 – Washington St. @ Pine St.

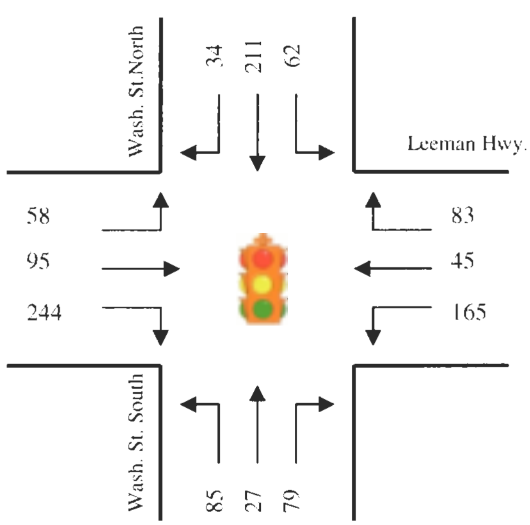


AM Peak Hour – August 2002
7:30 – 8:30 AM
PHF = 0.79

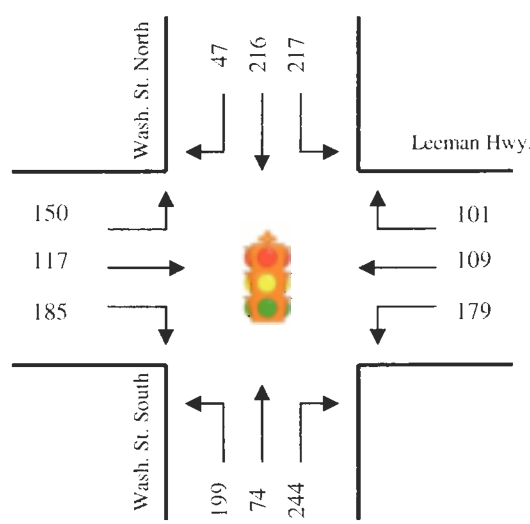


PM Peak Hour – August 2002
3:45 – 4:45 PM
PHF = 0.70

Figure A-12 – Washington St. @ Leeman Hwy



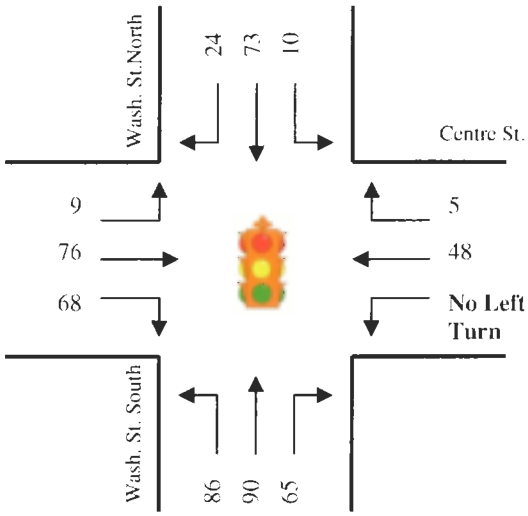
AM Peak Hour – August 2002
6:30 – 7:30 AM
PHF = 0.74



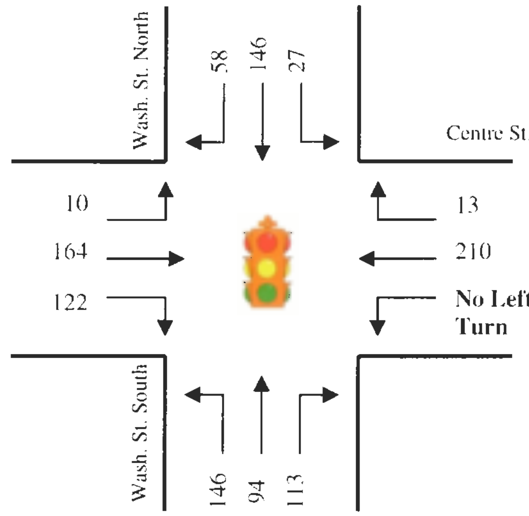
PM Peak Hour – August 2002
3:30 – 4:30 PM
PHF = 0.87

PHF = Peak Hour Factor

Figure A-13 – Washington St. @ Centre St.

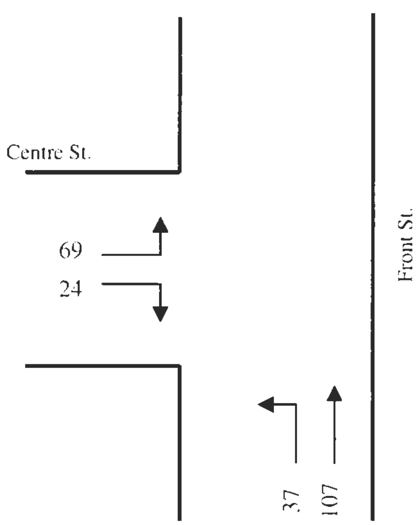


AM Peak Hour – August 2002
7:30 – 8:30 AM
PHF = 0.93

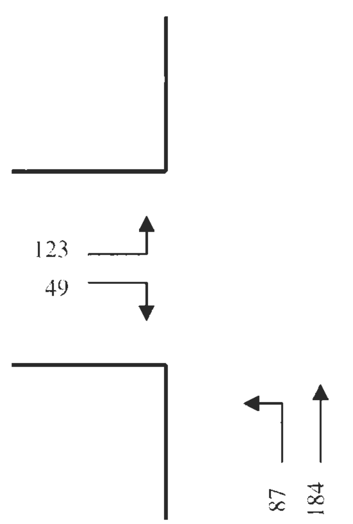


PM Peak Hour – August 2002
3:00 – 4:00 PM
PHF = 0.90

Figure A-14– Front St. @ Centre St.



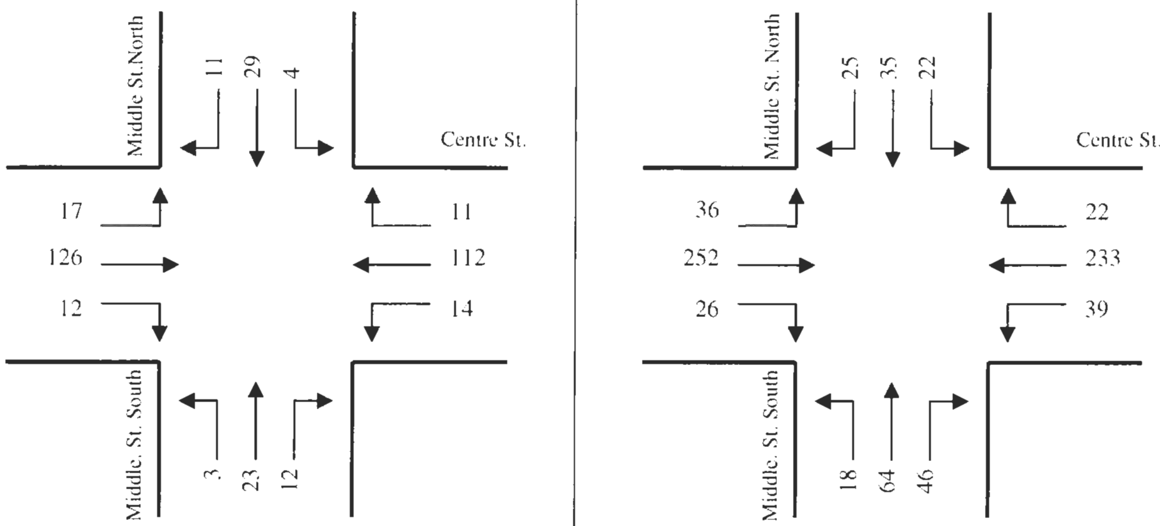
AM Peak Hour – August 2002
7:30 – 8:30 AM
PHF = 0.88



PM Peak Hour – August 2002
3:00 – 4:00 PM
PHF = 0.87

PHF = Peak Hour Factor

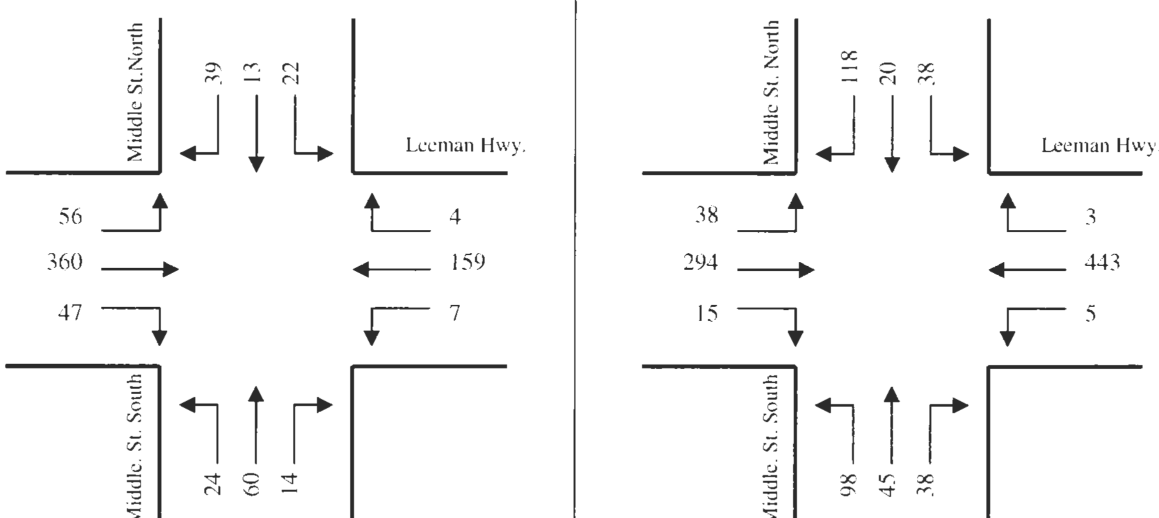
Figure A-15 – Middle St. @ Centre St.



AM Peak Hour – August 2002
6:30 – 7:30 AM
PHF = 0.91

PM Peak Hour – August 2002
3:15 – 4:15 PM
PHF = 0.84

Figure A-16 – Middle St. @ Leeman Hwy.

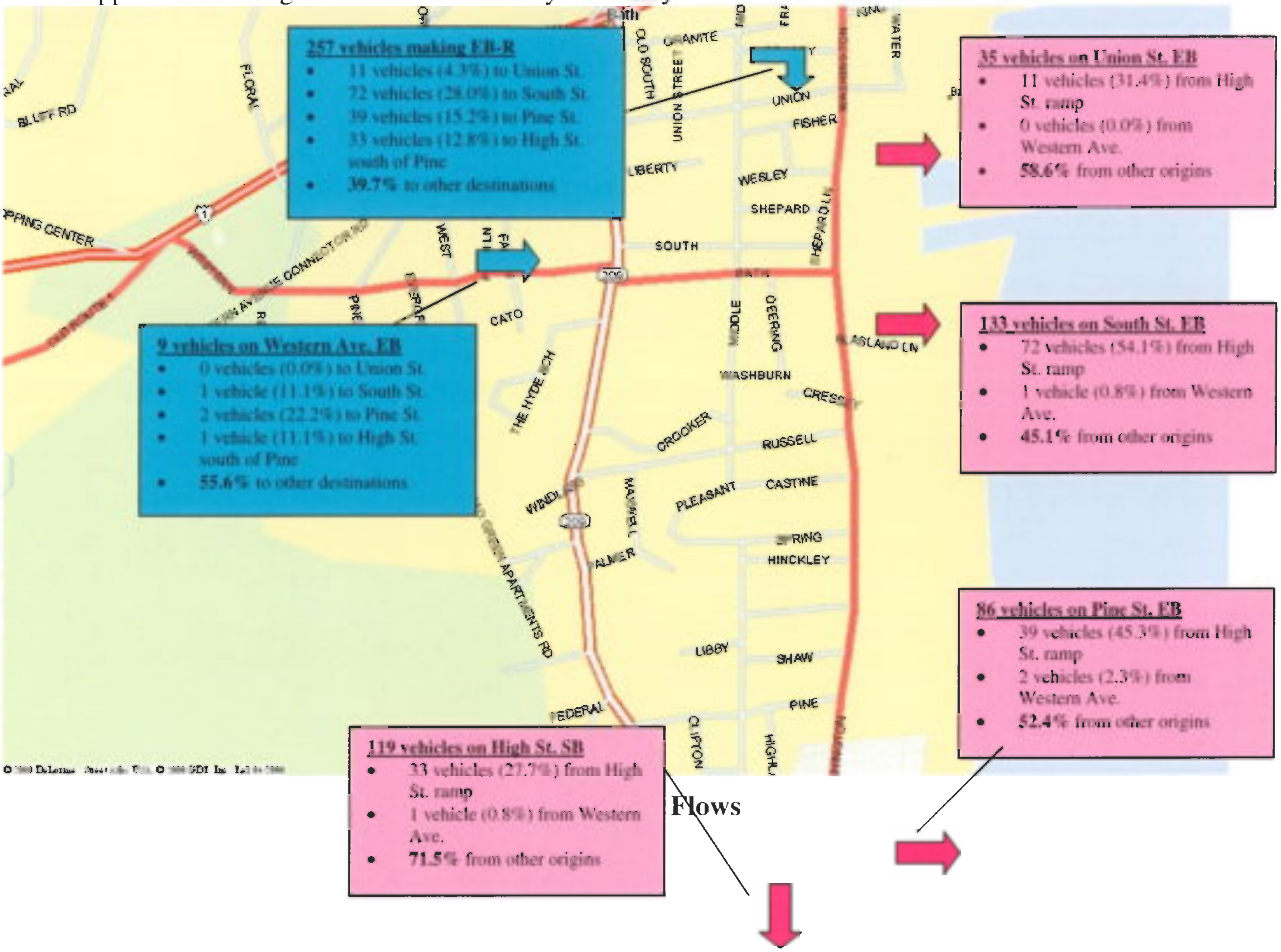


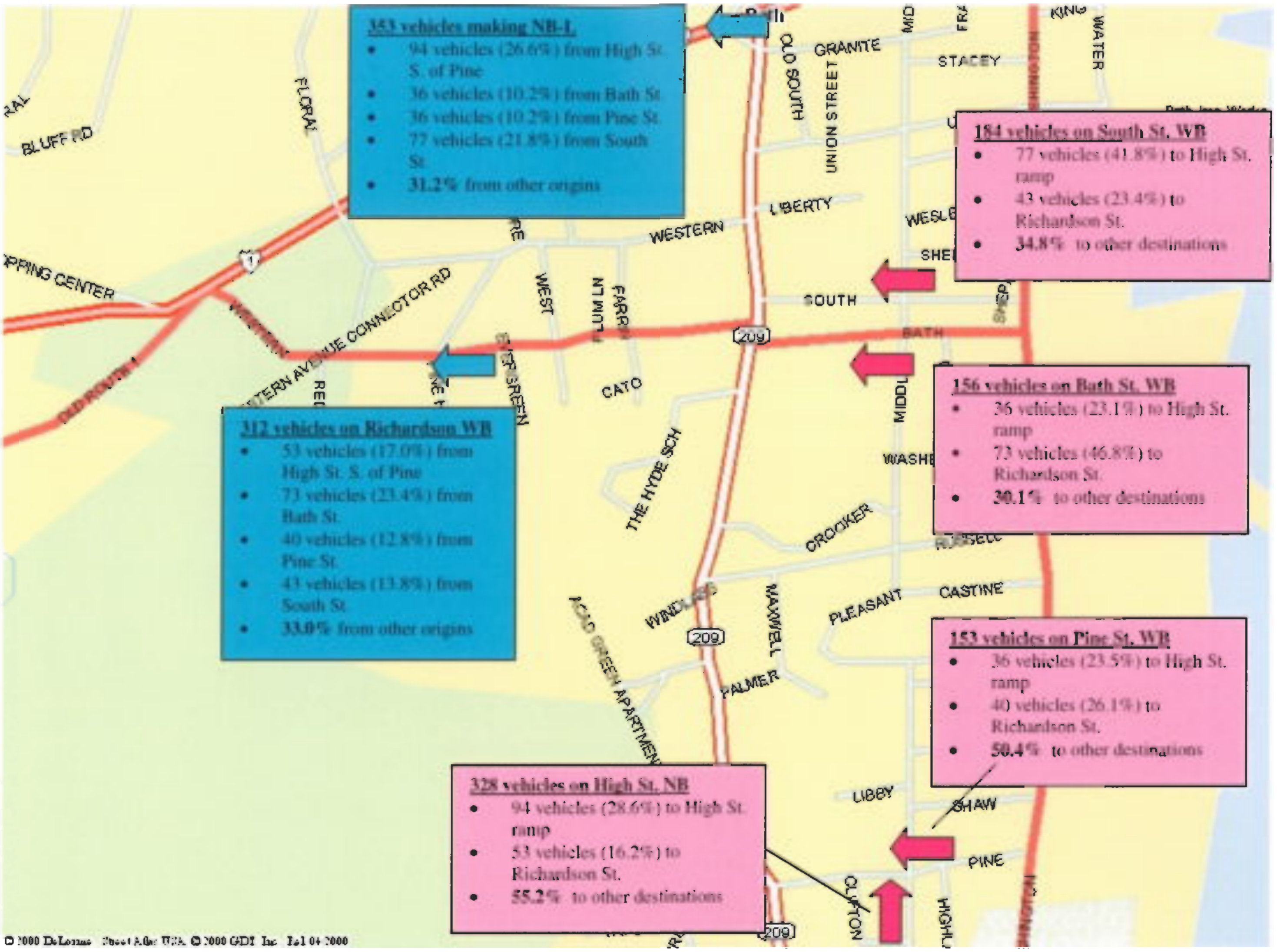
AM Peak Hour – August 2002
6:30 – 7:30 AM
PHF = 0.72

PM Peak Hour – August 2002
3:15 – 4:15 PM
PHF = 0.73

PHF = Peak Hour Factor

Appendix B – Origin – Destination Survey Summary





PM Peak – O-D Flows

Wilbur Smith Associates

April 6, 2004

TECHNICAL MEMO

TO: File

FROM: Michael Morehouse, P.E.
Sharat Kalluri, P.E.

SUBJECT: MaineDOT
Bath Feasibility Study
MaineDOT PIN # 10123.00
Travel Demand Modeling: Current Year and Future Year Base Conditions; Build Strategies Volumes

Purpose

The purpose of this memorandum is to document current and future year travel demand forecasting efforts and the methodology to develop future No Build and Build traffic volumes at key locations in the Study Area for the Bath Feasibility Study. The memorandum will (1) document the steps in model development, (2) summarize the results of this process, (3) summarize the methodology for developing future traffic volumes, and (4) provide a comparison of future no-build and build traffic volumes.

Overview

For this study, travel demand forecasting for the P.M. peak hour was conducted. In addition, the level of detail of the demand model needed to be sufficient for the projection of impacts at the minor arterial level. For these reasons, it was determined that the statewide travel demand model maintained by Maine Department of Transportation (MaineDOT) would not be compatible with the level of analysis/detail required and a new model with more network detail and smaller Transportation Analysis Zones (TAZ) needed to be developed. It was determined that the TransCAD travel demand modeling software offered an appropriate solution by allowing efficient network development using available GIS data and peak hour trip table development using matrix estimation procedures. The following paragraphs summarize the modeling methodology used for this study.

Developing the TAZ Structure

Since the MaineDOT model does not have Traffic Analysis Zone (TAZ) detail that allows for the distribution of trips within the City of Bath, a new TAZ structure was developed. This TAZ structure is illustrated in Figure 1-1, page 2. Twenty nine internal and external zones were developed. The internal zones encompassed the areas of Bath, West Bath, Woolwich and Arrowsic. External zones were created at the entry/exit points to the network.

Building the Network

The roadway network in the MaineDOT model, while sufficient for statewide modeling, does not include the local road links for the City. A new network was created from a GIS

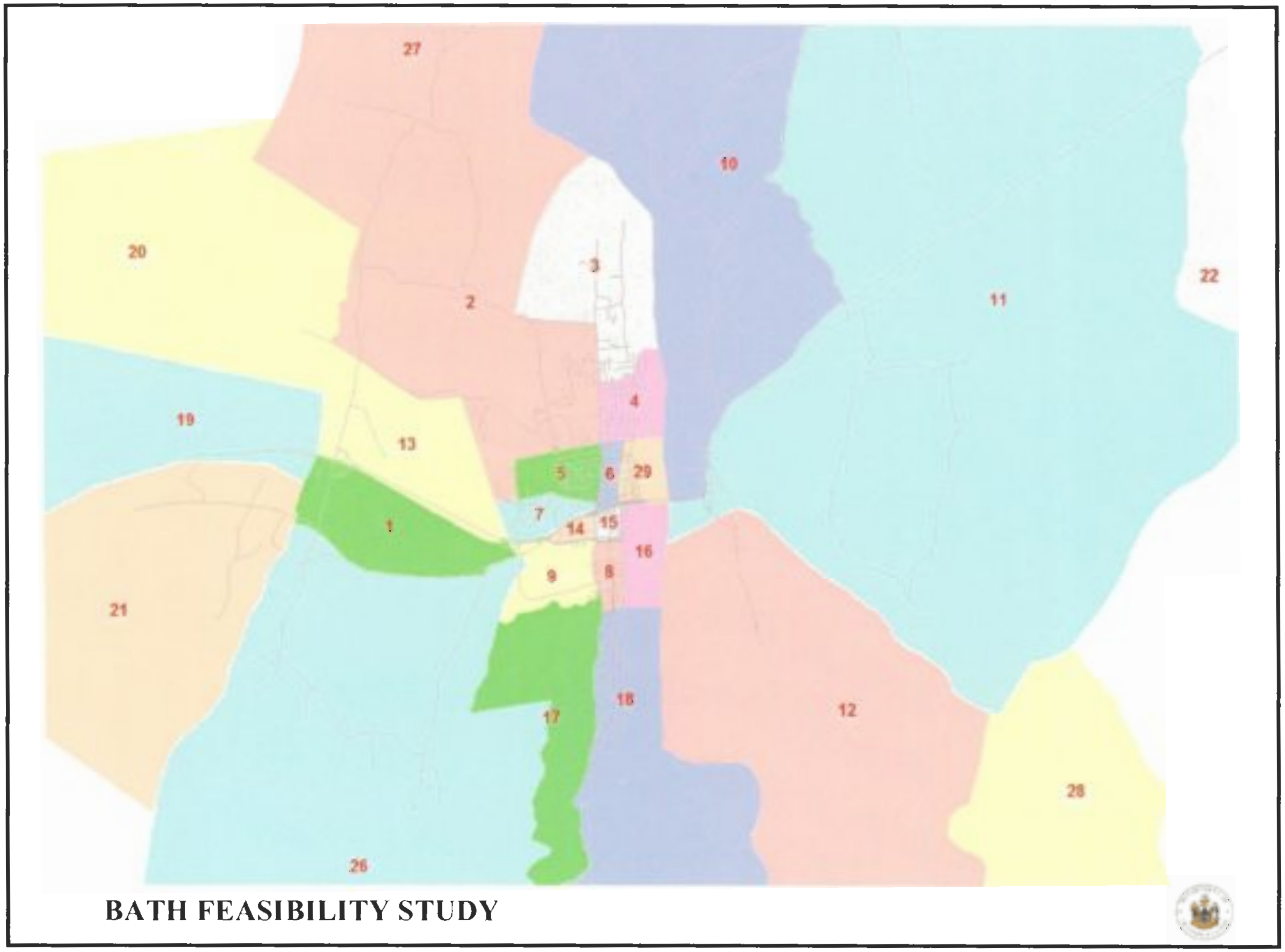


Figure 1-1 Traffic Analysis Zones

database that included fields for link distance, direction, speed and capacity (obtained from the MaineDOT road centerline GIS file with TINIS roadway attribute data attached). Field verification was necessary to fine tune the network to reflect actual conditions.

Connecting Centroids

Centroid links were coded into the roadway network to reflect locations of load points where trips from a particular TAZ would logically feed into the network. Aerial maps were used to verify locations of major developments and driveway locations. The roadway network including centroid connectors is illustrated in Figure 1-2, page 4.

Inputting P.M. Peak Traffic Volume

Traffic counts were collected on roads throughout the City of Bath at key Study Area locations during the P.M. peak hour period. The traffic counts were entered into the GIS road network database to be subsequently used for trip table estimation and assignment calibration. In addition to the traffic counts performed specifically for this study, daily traffic volume data was also used. These volumes were factored where necessary to reflect the peak seasonal travel time according to MaineDOT Weekly Group Mean Factors (2001).

Synthesizing P.M. Peak Trip Table

TransCAD has the capability to synthesize trip tables based on available traffic count data. The software uses a multi-path matrix estimation procedure that simultaneously assigns trips along a network and makes adjustments to a seed trip table in order to match the traffic counts. It takes into consideration the time required for multiple trip paths between origin and destination zones and performs iterative calculations until counts are matched and an optimum solution is achieved. This methodology was employed to create a trip table that reflected P.M. peak period conditions. The resulting trip table was checked for reasonableness. Smoothing of the trip table reduced some clumping of trips based on local knowledge, preserving row (origin) and column (destination) trip totals.

Calibrating Existing Year Traffic Assignment

While the matrix estimation procedure produced a traffic assignment that was reasonably well calibrated based on the existing traffic count data, it was necessary to fine tune the assignment by making slight adjustments to various link attributes. In most cases, link speed was adjusted to compensate for disproportionate loadings of trips on adjacent links and to adjust the routing of traffic to reflect current routing.

Fratar Factoring the Trip Table

To factor the existing year trip table to reflect 27 years of anticipated growth (2003 to 2030), the Fratar[1] methodology was used. This methodology uses forecasted population

[1] A method used for extrapolating trip distribution on the basis of growth factors for both the origin and the destination, named after its developer.

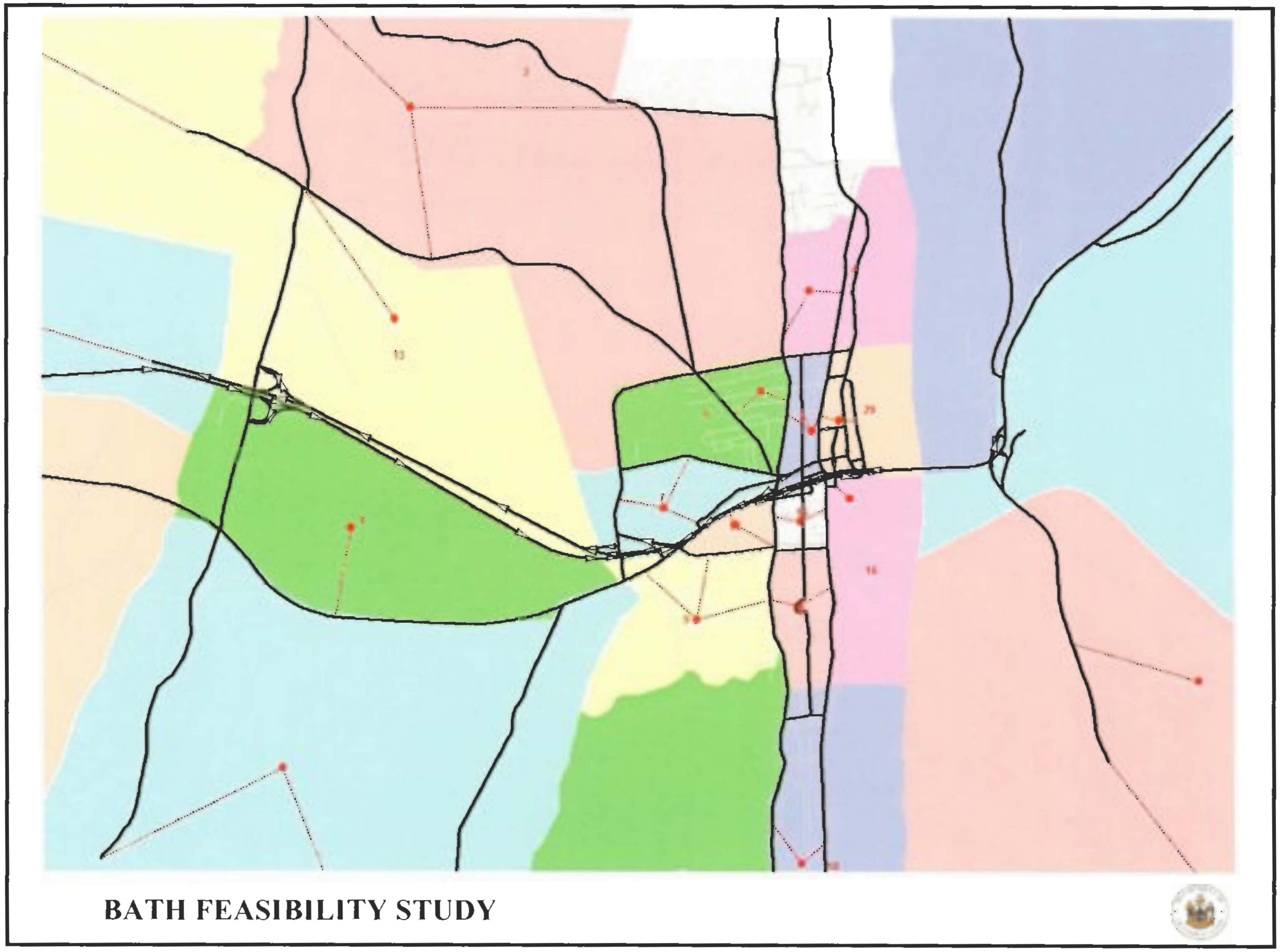


Figure 1-2 Base Year (2003) Traffic Network

and employment to create factors that inflate trips to future year levels. The population and employment forecasts reflected forecasted growth as provided in REMI[2] model forecasts prepared for the MaineDOT. External link volumes were factored according to growth projections in the MaineDOT model and other studies performed in the area.

Table 1-1 below shows the factors used for future year forecasts.

Table 1-1
Factors for Future Year Forecasts

Zone	Growth Factor
1	1.27
2	1.00
3	1.00
4	1.00
5	1.00
6	1.00
7	1.21
8	1.00
9	1.13
10	1.19
11	1.19
12	1.17
13	1.37
14	1.00
15	1.00
16	0.86
17	1.00
18	1.00
19	1.66
20	1.49
21	1.62
22	1.58
23	1.49
24	1.14
25	1.34
26	1.25
27	1.14
28	1.19
29	1.09

[2] Regional Economic Models, Inc.

Note: (1) For the internal zones, growth factors were calculated using Population and Employment data. A weighted factor was calculated based on the formula P+2E for existing and future conditions.

(2) For external zones, traffic growth factors were used.

Assigning Future Year Traffic (2030)

Using the factored trip table, a future-year assignment was run and the results are illustrated in Figure 1-3, page 7. Based on Figure 1-3 and analysis of the trip tables, the following observations were made about P.M. peak hour travel:

- Overall P.M. trip growth (as reflected in the number of trips in the trip table) in the Study Area is expected to be about 32% over the next 27 years. This equates to about 1.0% per year. This is not traffic growth on any particular roadway facility.
- The future traffic on Route 1 west of the viaduct is expected to increase by about 49% in the northbound direction and about 55% in the southbound direction.
- The future traffic on Route 1 along the viaduct is expected to increase by about 49% in the northbound direction and about 73% in the southbound direction.
- The future traffic on Route 1 on the Sagadahoc Bridge is expected to increase by about 37% in the northbound direction and about 53% in the southbound direction.
- Through trips (not traffic) are expected to increase by about 50% to 60% over the next 27 years.
- Internal (both trip ends within Bath) are expected to increase by a total of about 1% over the next 27 years.
- Trips with only one trip end in Bath are expected to increase by about 15% over the next 27 years.

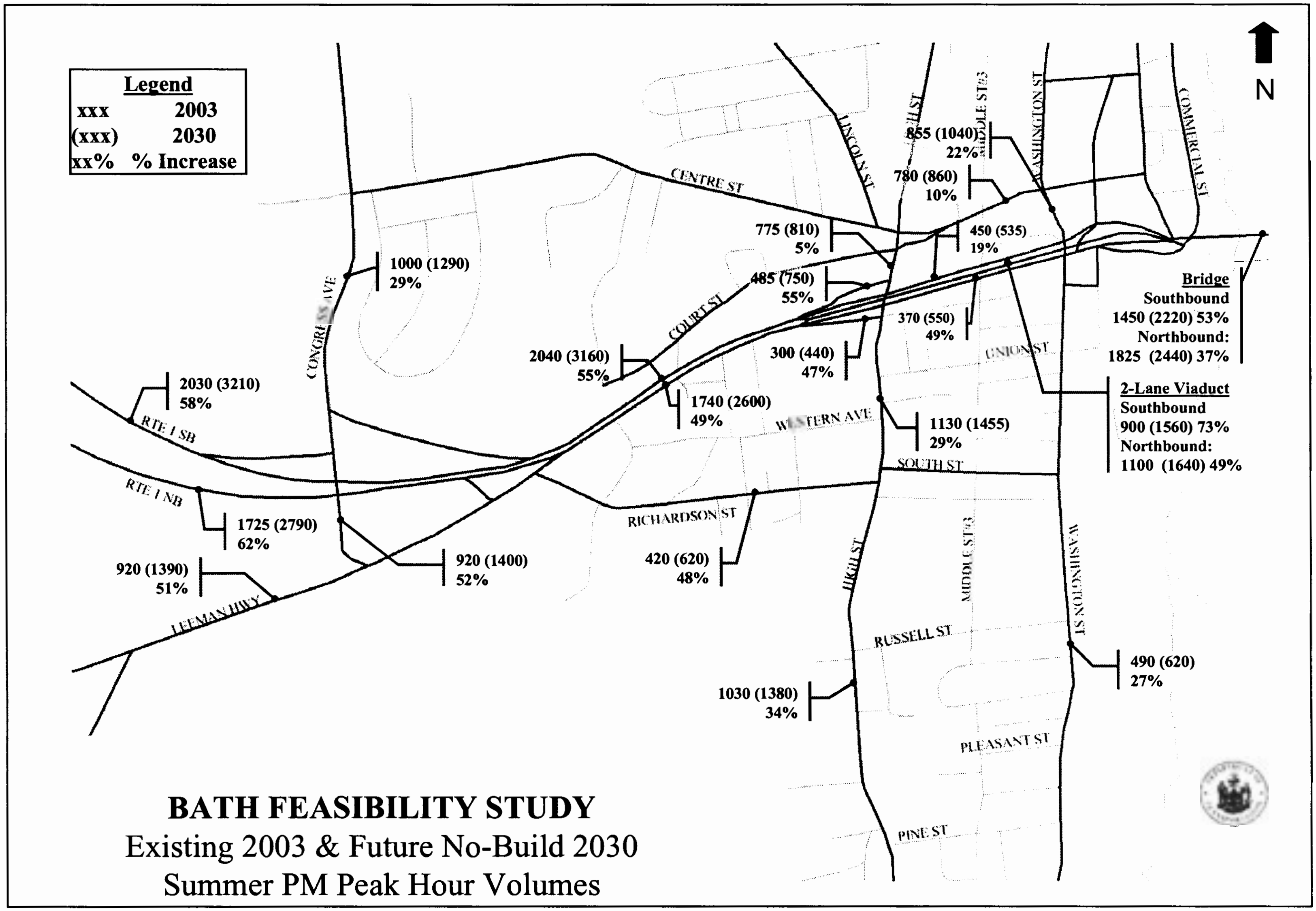


Figure 1-3 Existing and Future Year Traffic Assignments

<u>Build Strategies Overview</u>

The Bath Feasibility Study evaluated the following Build Options:

- **Route 209 Spur Option** – Construction of a two lane limited access roadway between Congress Avenue at the western end and Washington Street at the eastern end. Under this strategy, modifications will be made to the Congress Avenue interchange and to the local road network in the South End neighborhood. The proposed Route 209 Spur will have at-grade intersections with Leeman Highway, High Street, and Washington Street.

- **Four Lane Viaduct Option (C1-D1)** – This strategy is a combination of the Commercial Zone (C1) and Downtown (D1) options. The C1 option maintains the existing four lane cross section west of the High Street overpass but provides opportunities for a wider median along Route 1. The High Street overpass will remain under this option. Right turn lanes into Shaw's (Court Street) and other abutting parcels will be provided from Route 1.

  Option D1 consists of the widening of the existing two-lane viaduct to four lanes and providing a direct access from Route 1 to downtown feeder streets via Commercial Street. The Washington Street intersection underneath the viaduct will remain.

- **At-Grade Option (C2-D2)** – This strategy is a combination of the Commercial Zone (C2) and Downtown (D2) options. The C2 option consists of providing a signalized intersection at Shaw's (Court Street). Left and right turn lanes will be provided at the Route 1/Shaw's intersection as well as pedestrian crossing locations. The High Street overpass remains in this option.

  The D2 option consists of eliminating the viaduct and providing at-grade signalized intersections of Route 1 with Middle Street and Washington Street. Route 1 will consist of primarily a four-lane cross section with left and right turn lanes at intersections.

- **Depressed Option (C3A-D3)** – This strategy is a combination of the Commercial Zone (C3A) and Downtown (D3) options. In this strategy, Route 1 is depressed between Congress Avenue and the Sagadahoc Bridge. The C3A option consists of providing frontage roads along Route 1 to serve Shaw's (Court Street) and other local businesses. A crossover at Shaw's (Court Street) provides access across Route 1. The High Street overpass remains in this option.

  Under the D3 option, Middle Street is discontinued on both sides of Route 1. Also, a full interchange is provided at Washington Street to provide connection to downtown feeder streets.

- **Modified At-Grade Option (C1-D4)** – The Commercial Zone (C1) option is used in conjunction with the modified at-grade Downtown (D4) option. Under the D4 option, Route 1 has a four lane cross section with no signalized intersections. Middle Street and Washington Street serve as overpasses to Route 1. Direct access from Route 1 to downtown feeder streets is provided via at-grade ramps at Water Street.

- **Modified Depressed Option (C1-D5)** – The Commercial Zone (C1) option is used in conjunction with the modified depressed Downtown (D5) option. Under the D5 option, Route 1 has a four lane cross section and is inside a tunnel. Connection to downtown is provided via tunnel ramps to Commercial Street.

Methodology

Two methods were used to develop future (2030) Build P.M. traffic volumes:

1) For the Route 209 Spur Option, the TransCAD model was used to develop future (2030) traffic volumes. A new bypass roadway was added to the existing network connecting Congress Avenue and Washington Street. The Future Trip Table developed for the base condition was then assigned to the network. As a result, new future model traffic volumes were obtained from TransCAD which represented the estimated diversion due to the proposed bypass roadway. The new future model traffic volumes were then adjusted to represent forecasted future turning movement volumes for analysis purposes.

2) For the other Build Options, hand assignments of Future No Build traffic volumes were made based on an understanding of traffic patterns and the characteristics (changes in capacity, location of ramps, changes in traffic circulation) of the Build Option under analysis.

Comparison of Traffic Volumes

Table 1-2 below provides a comparison of traffic volumes under the Future (2030) No Build and Build options at select locations in the Study Area.

Table 1-2
Comparison of Future (2030) P.M. Peak Hour Traffic Volumes

Location	No Build	Route 209 Spur	C1-D1 Four Lane Viaduct	C2-D2 At Grade	C3A-D3	C1-D4	C1-D5
Route 1 south of Congress Avenue							
Northbound	2790	2790	2790	2790	2790	2790	2790
Southbound	3210	3210	3210	3210	3210	3210	3210
Route 1 south of High Street							
Northbound	2600	2540	2600	2670	2670	2630	2630
Southbound	3160	2620	3600	3130	3160	3160	3160
Route 1 on Sagadahoc Bridge							
Northbound	2440	2440	2440	2440	2440	2440	2440
Southbound	2220	2220	2220	2220	2220	2220	2220
Congress Ave. north of Leeman Highway	1400	2140	1400	1160	1150	1400	1400
High Street north of Western Ave.	1455	710	1455	1340	1390	1580	1580
High Street north of Route 1 SB On-Ramp	810	730	810	730	1090	1080	1080
Frontage Rd. south of Washington Street							
Northbound	550	550	360	-	720	-	-
Southbound	535	535	535	-	500	-	-
Route 1 between High and Washington St.							
Northbound	1640	1640	1830	2410	1525	2135	2135
Southbound	1560	1560	1560	2095	1560	2080	2080
Washington St. south of Center St.	1040	1100	1040	960	1060	1070	830
Washington St. south of Russell St.	620	900	620	620	620	620	620

Source: Wilbur Smith Associates, 2003.

Key Observations

The following changes in traffic volumes were noted from the above table in comparison to the P.M. peak hour traffic volumes for the Build strategies:

209 Spur Option – The introduction of a bypass roadway diverts traffic volumes from Route 1 to the new roadway. As a result, there is an increase in traffic volume on Congress Avenue, north of Leeman Highway, and Washington Street, south of Russell Street. Traffic volumes on High Street decrease as a result of this diversion. Very little/negligible traffic change is forecasted for Route 1 east of High Street due to the Rotue 209 Spur.

Four Lane Viaduct (C1-D1) Option – Under this option, traffic previously using the frontage road to access downtown diverts to Route 1 to access the downtown feeder streets. This shift is observed in the northbound direction on Route 1.

At Grade (C2-D2) Option – Under this option, the introduction of a traffic signal at the Route 1/Shaw's (Court Street) intersection shifts traffic from Congress Avenue south of the Route 1 interchange to the Western Avenue extension approach to Route 1.

Depressed Route 1 (C3A-D3) Option – The elimination of the Route 1/Middle Street intersection increases traffic volumes on High Street and Washington Street, north of Route 1. Also, this alternative provides frontage roads serving the Shaw's (Court Street) intersection. Therefore, a reduction in traffic volume was noted on Congress Avenue, north of Leeman Highway.

Modified At Grade (C1-D4) Option – The elimination of the Route 1/Middle Street intersection increases traffic volumes on High Street, north of Route 1. The Route 1 traffic volumes between High Street and Washington Street are higher because there is no frontage road.

Modified Depressed (C1-D5) Option – The C1-D5 option is similar to the C1-D4 option except that Washington Street does not have access to and from the south. Therefore, the traffic volumes on Washington Street, south of Centre Street reduce under this option.

Figures 1-4 through 1-9, pages 12-17, also present the comparisons between the various Build Options and the No Build.

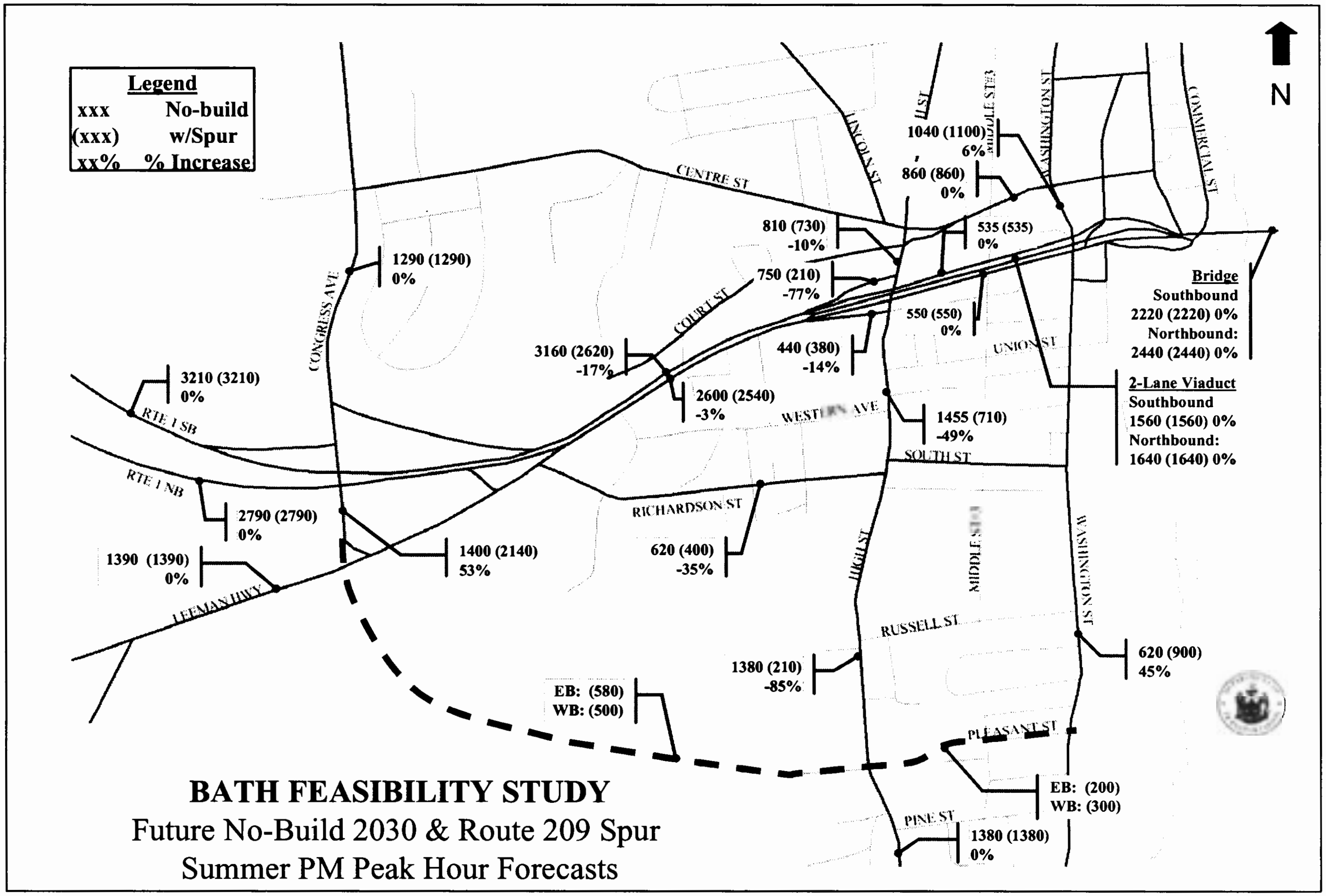


Figure 1-4 Future No Build and 209 Spur

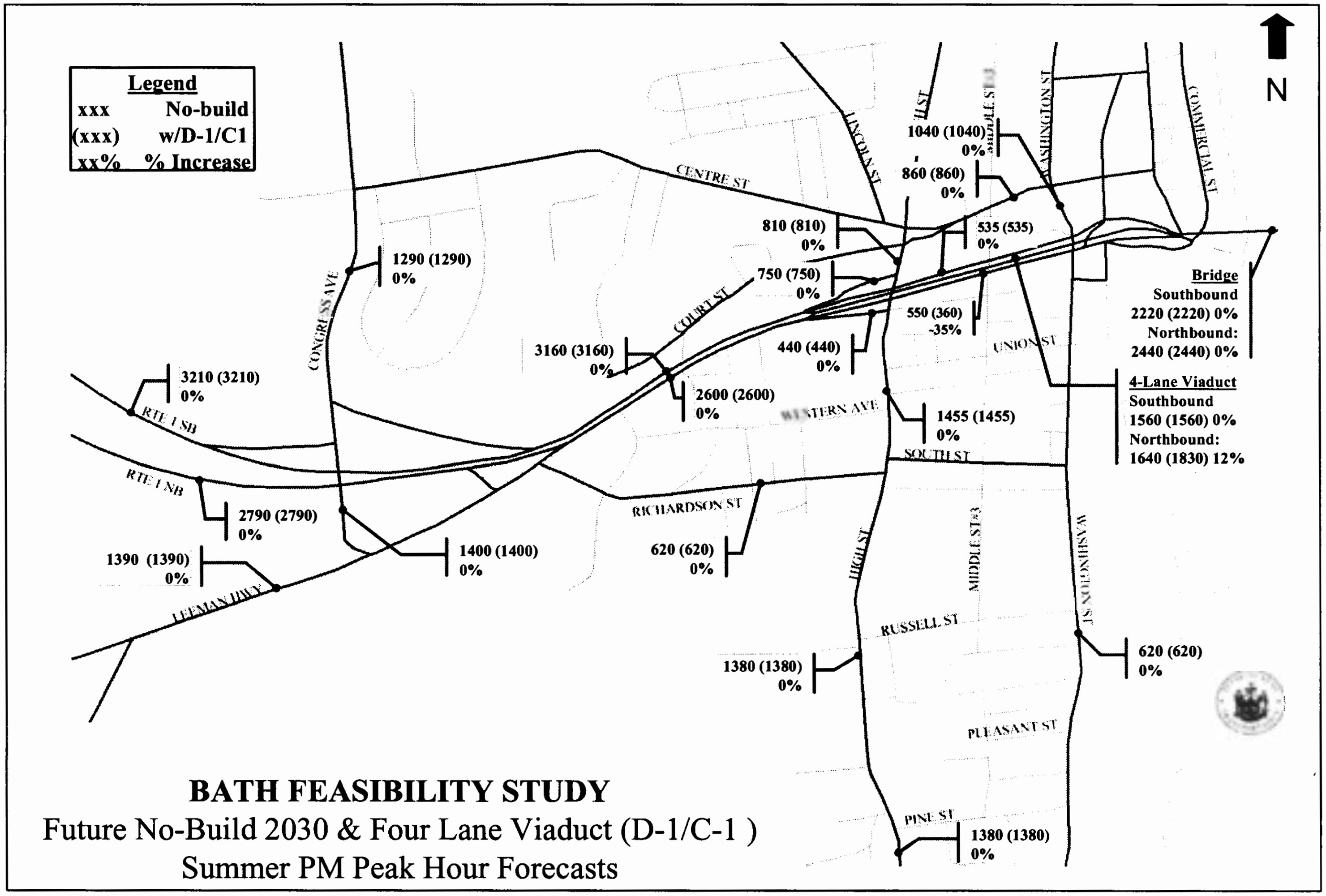


Figure 1-5 Future No Build and Four Lane Viaduct (C1-D1)

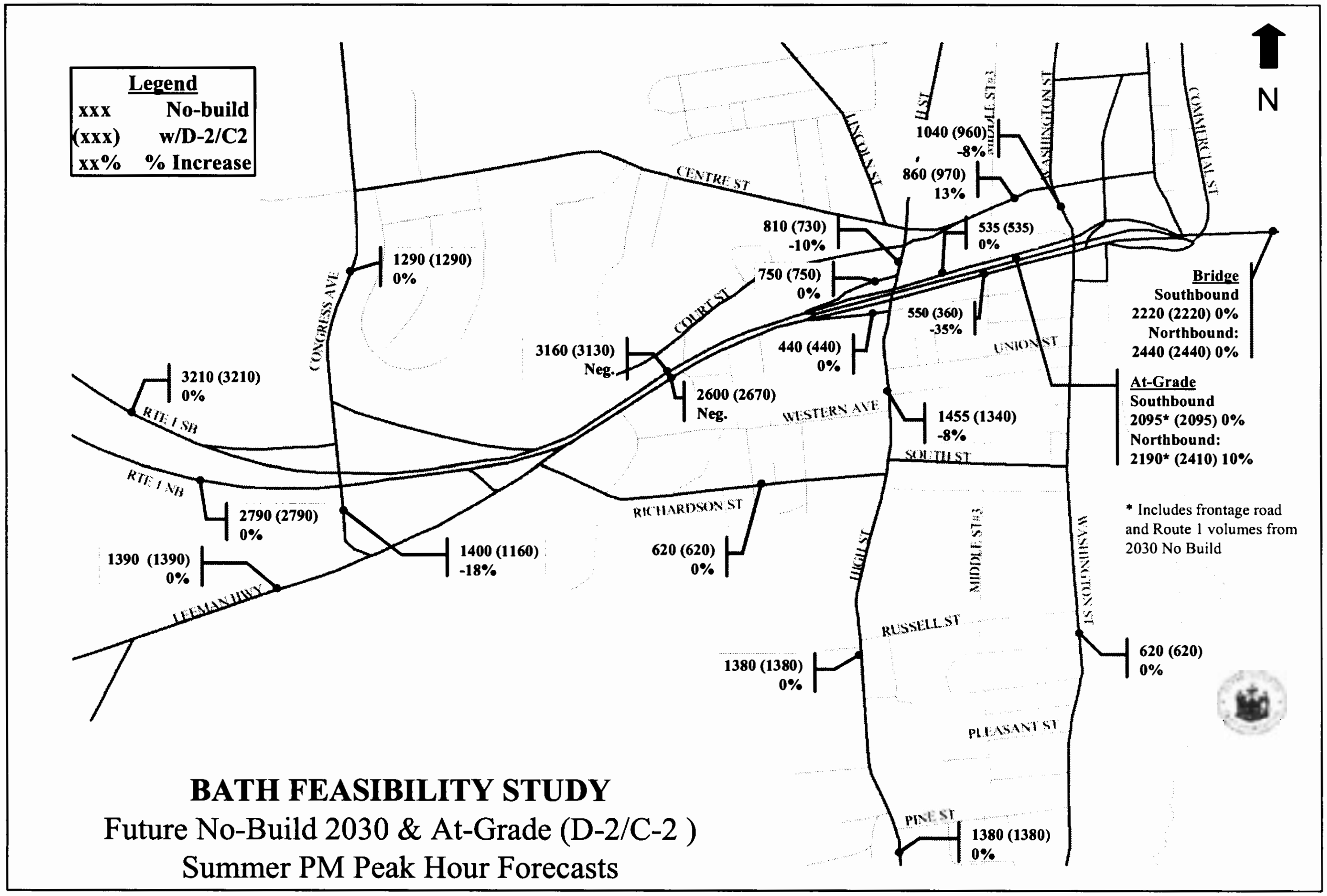


Figure 1-6 Future No Build and At-Grade (C2-D2)

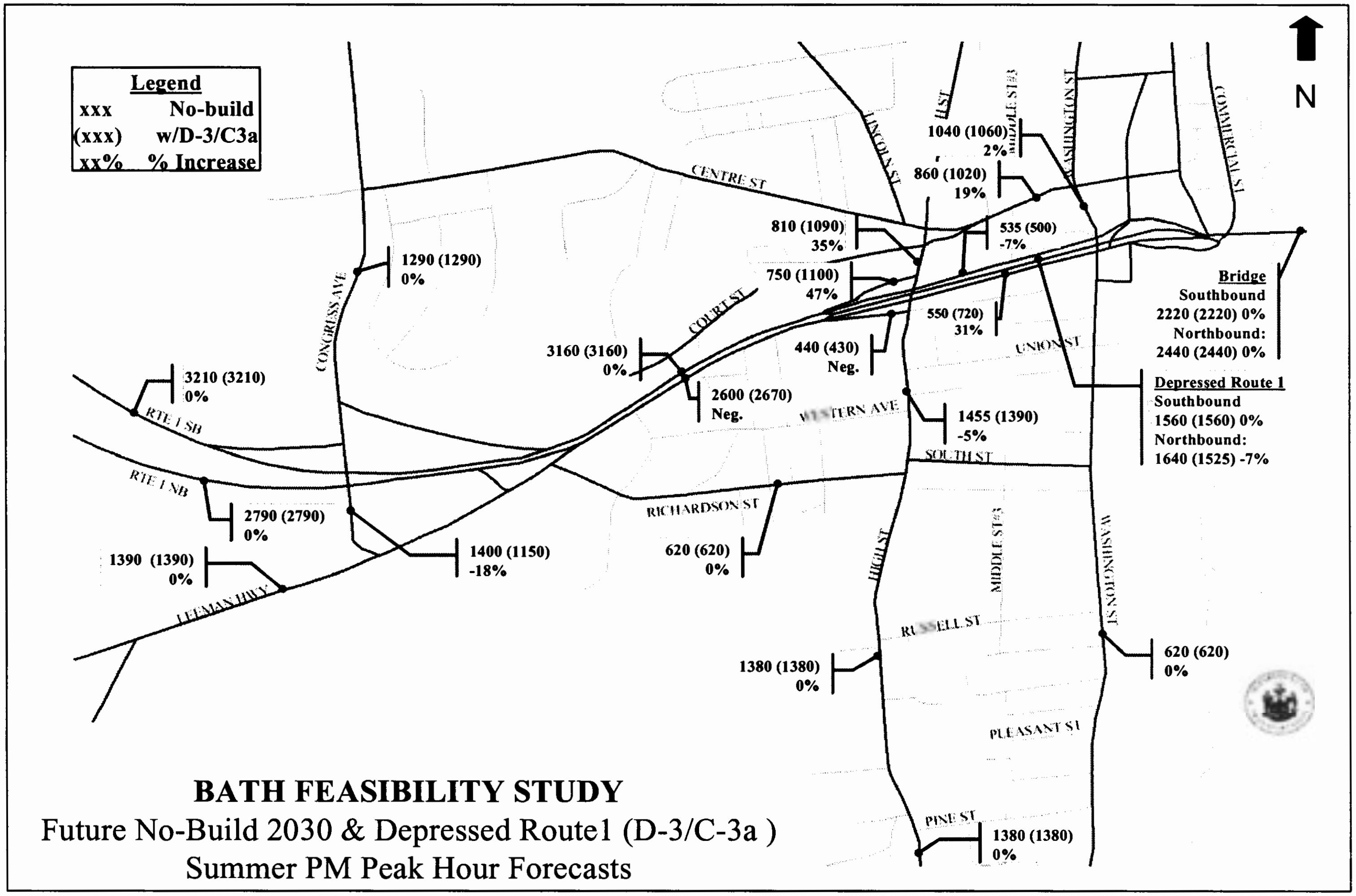


Figure 1-7 Future No Build and Depressed Route 1 (C3A-D3)

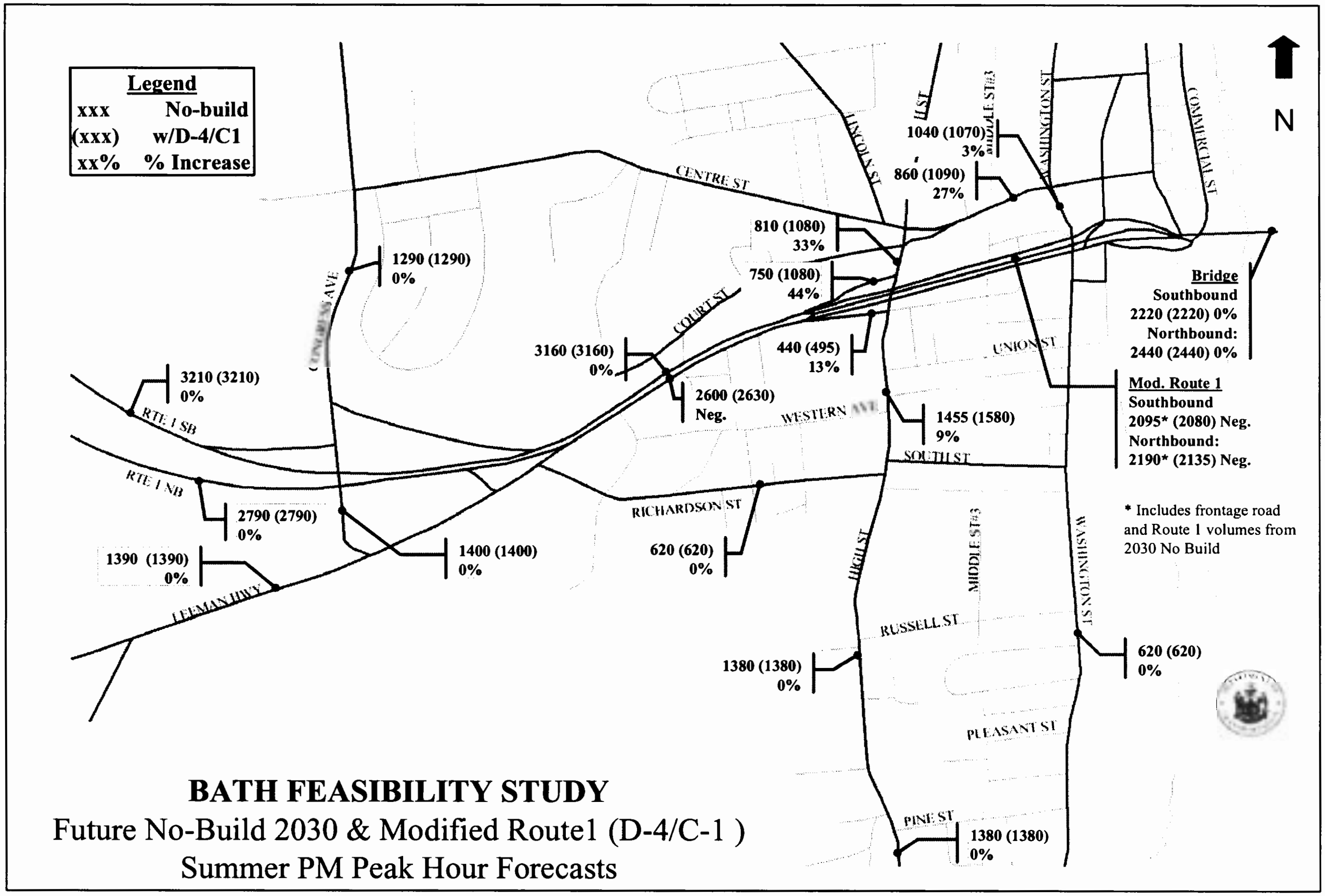


Figure 1-8 Future No Build and Modified Route 1 (C1-D4)

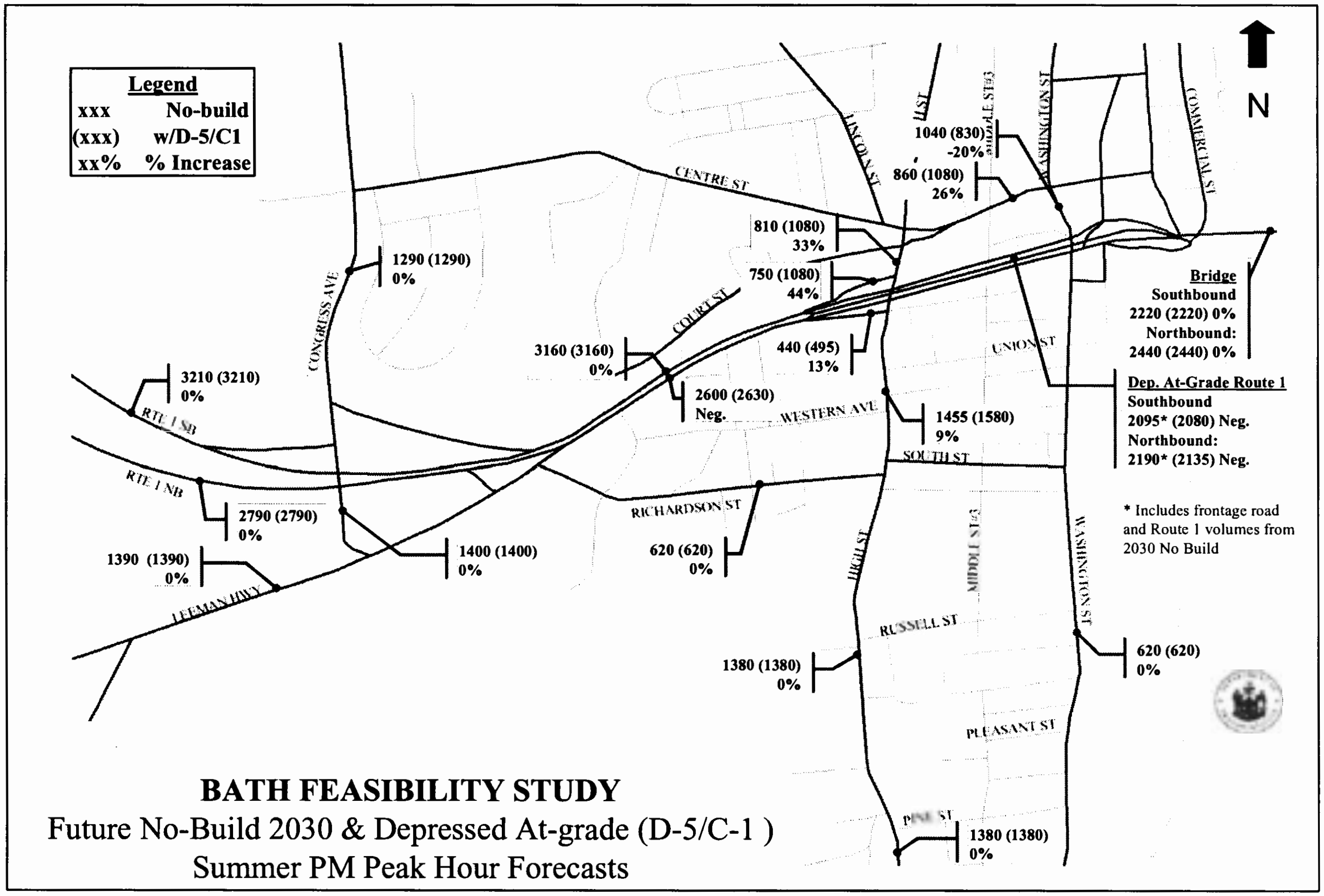


Figure 1-9 Future No Build and Depressed At-Grade Route 1 (C1-D5)

HNTB
The HNTB Companies

Technical Memorandum

To: File: 36527-PL-001-005 **Date:** March 17, 2004

From: Don Ettinger

Subject: Maine DOT
Bath Feasibility Study
MaineDOT PIN # 10123.00
Utilities Information

Utility Process

The Study Team requested and received a list of utility contacts for the Study Area from Maine DOT. The following is a summary of utilities in the Study Area:

- Bath Water District
- City of Bath (Sewer & Storm Drainage)
- Central Maine Power
- Susquehanna Communications (Cable)
- Verizon Communications

The Study Team mailed letters, questionnaires, and Study Area maps to the utility owners. The letters provided a brief description of the study, its purpose, and its schedule. Separate Study Area maps for rail and roadway were included in the mailing. The letters requested the utility owners review the provided maps and mark the locations of & label size & type of their major existing facilities, particularly those facilities located outside State and local right-of-way. It was requested that the questionnaire be completed and returned to the Study Team.

Information received from the utilities was reviewed by the Study Team and incorporated into the Study accordingly.

Utility Response

Below is a summary of responses received from the utility owners. Refer also to the attached figure entitled "Bath Feasibility Study Major Utilities", on page 3 of 3.

Bath Water District
- Underground facilities present within the Study Area
- Facility improvements planned in the future
- Would likely upgrade existing water mains to 12" DI pipe at Route 1 crossings, at the time of project construction.
- Water mains appear to be located within State and local right-of-way

City of Bath
- Underground sewer mains and storm drainage systems present within the Study Area
- Facility improvements planned in the future
- Electronic drawings of sewer facilities were provided.

- A major combined sewer overflow system exists between Route 1 and the train station.
- Sewer mains and storm drain systems appear to be located within State and local right-of-way

Central Maine Power

- Underground and overhead facilities present within the Study Area
- Facility improvements planned in the future
- Maps showing transmission line and substation locations were provided and incorporated in the base mapping.
- An existing transmission line crosses Route 1 just west of the Congress Avenue crossing.
- Existing transmission lines and substations are located west and south of the proposed State Route 209 Spur Option.
- The rail Options would result in additional transmission line crossings.
- Distribution facilities appear to be located within State and local right-of-way
- Transmission line and substation facilities appear to be located on private land.

Susquehanna Communications

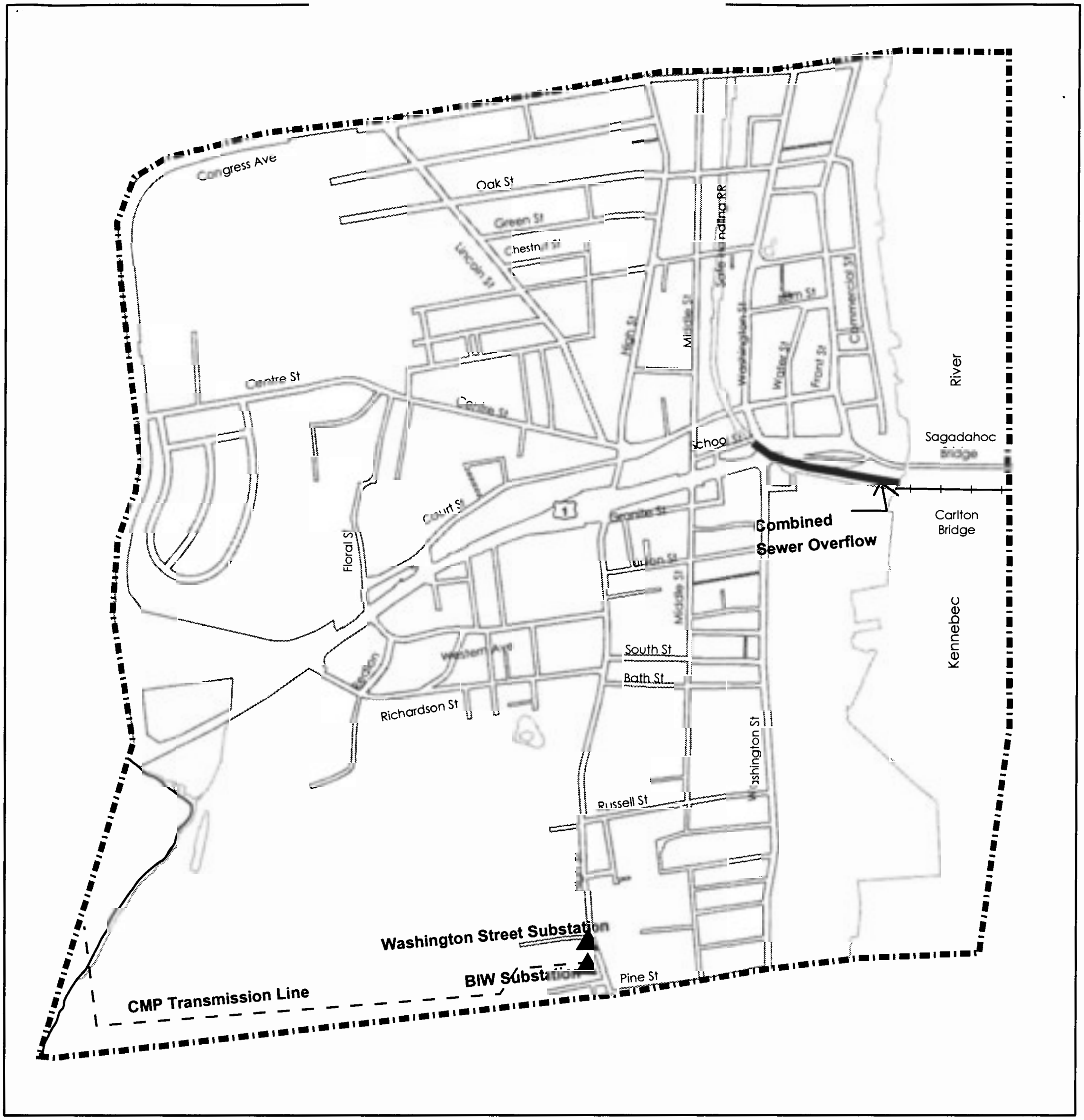
- Underground and overhead facilities present within the Study Area
- Facility improvements planned in the future
- No other details or information provided
- Facilities assumed to be located within State and local right-of-way

Verizon Communications

- Underground and overhead facilities present within the Study Area
- Facility improvements planned in the future
- No other details or information provided
- Facilities assumed to be located within State and local right-of-way

<u>Results</u>

Major transmission and substation facilities within the Study Area are shown on the Major Utilities figure, on page 3 of 3. From the information available, it appears that the majority of utilities identified are located within State and local right-of-way. The exception is the Central Maine Power transmission lines and substations, which are located on private land. The conceptual design of the roadway Options do not impact Central Maine Power transmission lines or substations. Some of the rail Options may have impacts to the Central Maine Power transmission lines.



Roadways

Transmission Line

Combined Sewer Overflow

Study Area

Substation

Bath Feasibility Study
Major Utilities
Maine DOT PIN 10123.00

BATH

Feet
0 250 500 1,000 1,500 2,000